This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

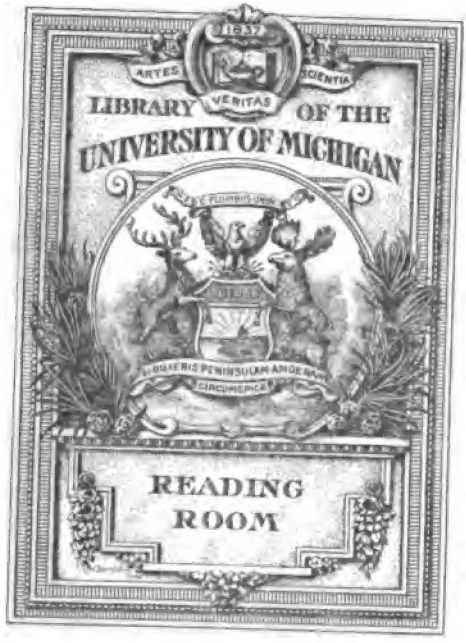
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 483909


ARTES
VERITAS
SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
READING
ROOM

AE
5
.A65
1920

APPLETON'S NEW PRACTICAL CYCLOPEDIA

VOLUME V

APPLETON'S NEW PRACTICAL CYCLOPEDIA

A NEW WORK OF REFERENCE
BASED UPON THE BEST AUTHORITIES, AND SYSTEMATICALLY ARRANGED FOR USE IN HOME AND SCHOOL

EDITED BY

MARCUS BENJAMIN, PH.D., SC.D., F.C.S.

EDITOR OF THE UNITED STATES NATIONAL MUSEUM
WASHINGTON, D. C.

ASSISTED BY

ARTHUR E. BOSTWICK, PH.D.

LIBRARIAN OF THE ST. LOUIS PUBLIC LIBRARY; FORMERLY, PRESIDENT OF THE AMERICAN LIBRARY ASSOCIATION

GERALD VAN CASTEEL
CHIEF OF EDITORIAL STAFF

GEORGE J. HAGAR
EXPERT COMPILER AND STATISTICIAN

WITH AN INTRODUCTION BY

ELMER ELLSWORTH BROWN, PH.D., LL.D.

CHANCELLOR OF NEW YORK UNIVERSITY; FORMERLY UNITED STATES COMMISSIONER OF EDUCATION

NEW AND REVISED EDITION

VOLUME V

NEW YORK
D. APPLETON AND COMPANY
1920

COPYRIGHT, 1910, 1913, 1915 1920, BY
D. APPLETON AND COMPANY

Copyright, 1895, 1896, 1897, 1899, by A. J. Johnson Co

Copyright, 1901, by D. Appleton and Company

PLATES

	FACING PAGE
BADGES AND ROSETTES OF PATRIOTIC SOCIETIES	50
FANCY PIGEONS	114
THE REGIONS ABOUT THE NORTH AND SOUTH POLES	146
THE BURIED CITY OF POMPEII	156
ART PORCELAIN	172
STANDARD BREEDS OF POULTRY	174
PRECIOUS AND SEMI-PRECIOUS STONES	180
ORIENTAL RUGS	346
FAMOUS EXAMPLES OF SCULPTURE	438

MAPS

THE PANAMA CANAL	20
PARIS	34
THE PHILIPPINE ISLANDS	94

357379

KEY TO PRONUNCIATION

ā, as in *fate*.
ă, as in *fat*.
å, as in *fall*.
ä, as in *father*.
ã, as in *welfare*.

ē, as in *meet*.
ĕ, as in *met*.
ė, as in *her* and *eu* in French *-eur*.

ī, as in *five*.
ĭ, as in *it*.

ō, as in *sober*.
ŏ, as in *not*.
ȯ, as in *fool* or *spoon*, or as *u* in *rule*.
o͝o, as in *foot*.
ȯ, as in *Göthe* and *eu* in French *neuf*.

ū, as in *mule*.
ŭ, as in *but*.
u͝u, produced with lips rounded to utter *oo* and tongue placed as in uttering *e*.
ů, as in *burn* or *burg*.

ch, as in German *ich*.

kh, as *ch* in German *nacht* and Scotch *loch*, and as *g* in German *tag*.

th, as in *thin*.

th, as in *though*.

ṅ, French nasal *n* and *m*; pronounce *ang*, *ong*, *ung*, etc., in usual way, but without sounding the *g*.

ñ, Spanish n-y, as in cañon; French and Italian —gn, as in Boulogne.

APPLETON'S

NEW PRACTICAL CYCLOPEDIA

VOLUME V

O'wen, John, 1616–83; English theologian; b. Stadham, Oxfordshire; received the living of Fordham, Essex, 1642, which he exchanged for a Presbyterian pastorate at Coggeshall, near by, 1646, where he introduced independent church government; 1649, became private chaplain to Oliver Cromwell; 1651, dean of Christ Church, Oxford; vice chancellor of the university, 1652–57; declined invitation to become president of Harvard, 1670. Though a zealous opponent of Arminianism, Presbyterianism, Episcopacy, and papacy, all parties held him in high esteem; published more than eighty theological works.

Owen, Sir Richard, 1804–92; English anatomist; b. Lancaster; succeeded Sir Charles Bell as Hunterian professor in the Royal College of Surgeons, 1836; became superintendent of the Natural History Department of the British Museum, 1855, and retired, 1884; was Fullerian professor in the Royal Institution; succeeded Cuvier as the leading vertebrate paleontologist of the world; most important works, "Lectures on the Comparative Anatomy and Physiology of Invertebrate Animals," "Lectures on the Comparative Anatomy and Physiology of Vertebrate Animals," "Odontography," "On the Archetypes and Homologies of the Vertebrate System," "On the Nature of Limbs," "Palæontology."

Owen, Robert, 1771–1858; English social reformer; b. Newtown, Wales; 1799, married the daughter of David Dale, from whom with others he had bought the village and cotton mills of New Lanark, Scotland. Here he introduced a system of reform which proved for a time highly successful. He removed, 1823, to the U. S., and tried to found a communist society of New Harmony, Ind.; but the scheme failed, and, 1827, he returned to Great Britain, where experiments of a similar nature, attended by a similar result, were made at Orbiston, Lanarkshire, and at Tytherley, Hampshire. In 1828 he went to Mexico on the invitation of the government to carry out his experiment there, but effected nothing. He revisited the U. S. several times. His ideas are clearly developed in his "Lectures on a New State of Society," "Essays on the Formation of Human Character," and "Outline of the Rational System," and especially in his "Book of the New Moral World," in which he came forward as the founder of a system of religion and society according to reason. He finally became a spiritualist.

Owens, John Edward, 1824–86; American comedian; b. Liverpool, England; removed to the U. S., 1834; made his début in Masonic Hall, Philadelphia, August 20, 1846; 1849, was manager of the Baltimore Museum; 1854, of the Charles Street Theater of Baltimore; 1859, of the Varieties Theater of New Orleans; 1852, made his first tour in England; greatest creation, "Solon Shingle."

Owl, general name for the birds of prey of the order *Striges*, most of which are nocturnal in their habits, although a few, like the snowy and hawk owls, hunt by day. They have large

American Barn Owl.

heads and large eyes, directed forward and surrounded by a circle of radiating feathers. The plumage is soft, flight noiseless, and sense of hearing acute. There are some 200 species. They range in size from the great eagle owl (*Bubo maximus*) of Europe and Asia, over 2 ft. long, to the little gnome owls (*Glaucidium*)

of S. America, some of which are less than 6 in. in length. As they feed principally on

American Screech Owl.

small rodents, they are of more service to the farmer than any other bird.

Owl Par'rot, or **Kakapo'**, peculiar parrot (*Stringops habroptilus*) restricted to the forests of New Zealand, so called from its owl-like appearance and nocturnal habits; is a little over 2 ft. in length, heavily built, of a sap-green color mottled with brown and yellow. The bird is flightless.

Ox. See Cattle; Musk Ox.

Oxal'ic Ac'id, acid discovered by Scheele, 1776, or, as claimed by some, by Bergman; formula, $H_2C_2O_4,2H_2O$; chemical equivalent, 126; occurs in vegetables, animals, and rarely in minerals, as in the form of sesquioxalate of iron in humboldtite; is a frequent constituent of the juices of plants; name derived from its giving to the leaves of the wood sorrel (*Oxalis acetosella*) their very acid taste. In this and in the common sorrel (*Rumex acetosa*) it occurs combined with potash as binoxalate of potash. Combined with lime, it gives solidity to many lichens, and is found in the roots of rhubarb, valerian, and other plants. It is artificially produced by the oxidation of sugar or of starch by nitric acid, and on a large scale in England, for calico printing, by heating sawdust with a mixture of hydrate of potash. Two salts of oxalic acid are of importance, the binoxalate of potash and oxalate of lime. The former, known as salt of sorrel, sometimes improperly called salt of lemons, is used to remove ink stains from linen. From its strong affinity for lime, the acid is an excellent test of the presence of lime in solutions. Oxalic acid is largely employed in calico printing for discharging colors; it is also used for cleaning the straw of bonnet makers and the leather of boot tops, and for removing stains of ink and iron rust from fabrics. Oxalic acid is a strong poison.

Ox'alis, genus of dicotyledonous plants, commonly known as wood sorrel, and belonging to the geranium family. The species (205) are mostly natives of the subtropical regions N. and S. of the equator. A few are natives of Europe (two or three) and N. America (fourteen or fifteen); among the latter are the common wood sorrel (*Oxalis acetosella*), violet wood sorrel (*O. violacea*), yellow wood sorrel (*O. corniculata*, var. *striota*). Many species are cultivated in greenhouses for their fine foliage and pretty flowers.

Oxalu'ria, morbid condition of the general system which favors the excessive excretion of oxalic acid by the kidneys. It is also known as the *oxalic acid diathesis* and results from improper transformation of food or tissue elements in the processes of nutrition. It is allied to the condition which causes gout—*i.e.*, an increase of uric acid in the system.

Ox'en. See Bovidæ.

Ox'enford, John, 1812–77; English author; b. London; published translations of the "Autobiography of Goethe," the "Conversations of Eckermann with Goethe," the "Hellas" of Jacobs, "Illustrated Book of French Songs," and Kuno Fischer's "Essay on Lord Bacon and his Philosophy"; also produced several pieces for the stage.

Oxenstjerna (ŏks'ĕn-stĕr-nä), **Axel** (Count), 1583–1654; Swedish statesman; b. Fånö, Upland; studied theology and jurisprudence at Rostock, Jena, and Wittenberg, after his return to Sweden, 1602, employed by Charles IX in several important diplomatic negotiations, which he carried through with great sagacity and dignity. On the accession of Gustavus Adolphus, 1611, was made chancellor of Sweden, and as such negotiated the Peace of Knäröd with Denmark in 1613 and of Stolbowa with Russia in 1617, and the armistice with Poland in 1629, and accompanied Gustavus Adolphus during his campaigns in Germany, taking charge of all diplomatic affairs. After the fall of Gustavus Adolphus at Lützen, 1632, was empowered by the Swedish representatives to continue the war, and chosen by the Protestant princes to head the league against the emperor. Concluded an alliance with Holland and France, and returned, 1636, to Sweden as chief of the government during the minority of Gustavus Adolphus's daughter Christina. When she became of age in 1644, his influence decreased, and when she abdicated he retired altogether into private life. The second part of "Historia Belli Sueco-Germanici," of which Chemnitz wrote the first part, is generally ascribed to Oxenstjerna.

Ox'eye, common name of *Heliopsis lævis*, a native plant of the composite family, which resembles the sunflower; is a perennial, 2 to 4 ft. high, and not rare on banks and in copses; though called *lævis* (smooth), its leaves are often rough. For the oxeye daisy, see Daisy.

Ox'ford, Robert Harley (Earl of), 1661–1724; English statesman; b. London; raised a cavalry regiment for the Prince of Orange, 1688; entered Parliament, 1690, as an extreme Whig; became a Tory; was thrice speaker; chief Secretary of State, 1704; Chancellor of the Exchequer, 1710; created Earl of Oxford and

Mortimer and Lord High Treasurer, 1711; supplanted Marlborough in the queen's favor, and consolidated his own popularity by the Peace of Utrecht, April, 1713, but was in turn supplanted by Bolingbroke, and dismissed, July 27, 1714. Regarded with distrust by George I, he was impeached of high treason by Parliament, 1715; committed to the Tower; acquitted, 1717; lived thenceforth in retirement; accumulated immense collections of books and manuscripts, which, as the "Harleian Collection" were acquired by the British Museum.

Oxford, city of England, capital of Oxfordshire, on a gentle hill between the Cherwell and Isis or upper Thames, which here unite; 52 m. WNW. of London. Though irregularly built, with narrow, crooked streets and lanes, and few good thoroughfares, its appearance from a distance is picturesque and imposing. The cathedral is the chapel of Christ Church College, and St. Mary's is the university church. The city depends for support almost entirely on the university. The date of its foundation is unknown. It is mentioned as a seat of learning by Pope Martin II (abt. 882). Pop. (1901) 49,336. See OXFORD, UNIVERSITY OF.

Oxford, Univer'sity of, one of the two greatest seats of learning in Great Britain. It grew out of the gradual union of the schools originally attached to monasteries and other religious houses. The first known application to it of the word university (*universitas*) occurs in a statute of the third year of King John (1201). The first charter recognizing the university as a corporate body, and conferring additional privileges on it, was granted by Henry III, 1244. The government of the university is vested in three bodies: The Hebdomadal Council, which has sole power of initiation; the Congregation, which has power of rejection and amendment; and the Convocation, which has power of rejection alone. The following are the separate colleges with reputed dates of foundation: University, 872(?); Balliol, 1262; Merton, 1270; Exeter, 1314; Oriel, 1326; Queen's, 1340; New, 1386; Lincoln, 1427; All Souls, 1437; Magdalen, 1456; Brasenose, 1509; Corpus Christi, 1516; Christ Church, 1532; Trinity, 1554; St. John's, 1555; Jesus, 1571; Wadham, 1613; Pembroke, 1624; Worcester, 1714; and Hartford, 1874. Many colleges and universities in various parts of the kingdom and in the colonies are affiliated with Oxford Univ. Women are admitted to the examinations for the B.A. degree, but here at present their privileges cease.

The study of ancient literature, history, and philosophy—*literæ humaniores*—is the study most encouraged at Oxford; the degree is usually acquired in the classical schools. There are also schools in modern history, civil law, and theology, in which the examinations are usually attended by men who have passed through the classical schools. There are also colleges of mathematics, natural science, etc. Attached to each college are fellowships and scholarships, awarded in most cases by open competition. Instruction is conducted mainly by the college tutors; lectures are also delivered by the university professors. The highest officer in the university is the chancellor; the election is determined by the members in convocation, and the office is held for life. For the last two hundred years it has been the custom to elect some distinguished nobleman who has been educated at Oxford. There is no stipend attached to this office. By the will of Cecil Rhodes a scholarship fund amounting to about $10,000,000 was established. See RHODES SCHOLARSHIPS.

Oxford Move'ment. See TRACTARIANISM.

Ox Gall, bile of the domestic ox; used in scouring wool, since into its complicated composition there enters abundance of soda, which gives it a soapy quality. When properly refined from its coagulable and coloring matters it is used by artists in mixing colors, which it often improves in tint, while it fixes them and makes them flow better. It is also used in some kinds of artists's varnish and in cleansing ivory tablets.

Ox'ides. See OXYGEN.

Ox'pecker. See BEEEATER.

Ox'us, Amoo', Amu, or **Amoo Darya** (där'yä), river of W. Asia; rises on the Belur Tagh, nearly 15,000 ft. above the sea; receives many affluents from the mountains of Turkestan and the Hindu Kush; flows through Turkestan, and falls into the Aral Sea; length, 1,610 m. According to the treaty of peace concluded, July, 1873, between Russia and Khiva, this river became the permanent boundary line between Khiva and Bokhara.

Ox'ygen, most abundant of all elementary substances; symbol O; atomic weight, 16; composes eight ninths of the water on the globe, nearly one fourth of the atmosphere, and a large part of the earth's crust, principally in the form of oxides of the metallic elements; discovered by Priestley in England, 1774, and almost simultaneously by Schede in Sweden, and called by them respectively dephlogisticated air and empyreal air. The name oxygen was first used by Lavoisier, because he erroneously thought it essential to the constitution of an acid. Oxygen may be obtained by several methods, which depend on different physical as well as chemical principles. It may be mechanically separated from the nitrogen of the atmosphere by employing the principle of osmose in dialysis. It may be obtained from water by electrolysis; from several of its compounds by the dissociating action of heat; from other higher oxides of metals by heat alone, or by the joint action of heat and some substance which will unite with a lower oxide, thus leaving a part of the oxy-

COMBUSTION OF IRON IN OXYGEN.

gen free. Oxygen is colorless, tasteless, and inodorous. The product of the union of oxygen with another element is called an oxide. Thus when lead is heated in contact with the air it combines with oxygen, forming lead oxide, PbO; charcoal, or carbon, burns, forming carbon dioxide, CO_2; phosphorus burns, forming phosphorous pentoxide, P_2O_5. When pure it manifests the most energetic affinities. A combustible body—charred wood, a candle, etc.—if it have but a spark of fire, instantly kindles into flame when immersed in oxygen. The gradual combination of a metal with the oxygen of the air is known as rusting. It has been liquefied by the application of great pressure and cold. It is magnetic—more so than any other gaseous substance. Its density, air being unity, is 1.10561. In such affections as asthma, pulmonary emphysema, croup, diphtheria, dyspnœa from heart disease, etc., inhalations of oxygen are often useful. In some other diseases experience has shown that benefit has followed inhalations of oxygen.

Oxygena'ted Wa'ter. See HYDROGEN PEROXIDE.

Oxyhæmoglobin (ŏks-ĭ-hĕm-ō-glō'bĭn), combination of hemoglobin, the coloring matter of the blood, with oxygen. This compound readily renders up its oxygen to the tissues when reduced hemoglobin results, which in turn becomes oxyhæmoglobin after the blood is aërated in the lungs. The bright-red color of arterial blood is due to this compound, while the darker color of venous blood is due to reduced hemoglobin.

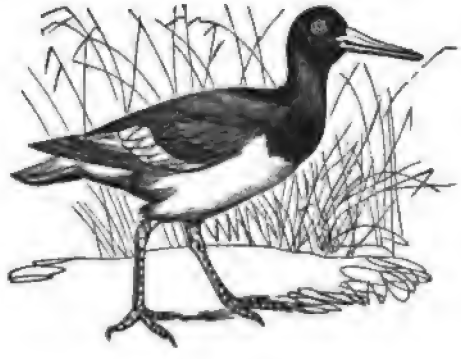
Oxyhy'drogen Blow'pipe, apparatus invented, 1801, by Dr. Robert Hare, of Philadelphia, for producing a very high temperature by burning hydrogen and oxygen together; now extensively used for melting platinum and for producing the calcium light, by rendering a piece of lime intensely hot.

Oyama (ō-yä'mä), **Prince,** 1844–1916; Japanese military officer; b. Kagoshima; member of the Satsuma clan; aided, 1868, in rescuing the emperor from the aggressions of the Shogunate and restoring him to the throne, for which he was made major general; served as military attaché on the French side during Franco-Prussian War; on return entered Ministry of War and assisted in reorganizing army; commanded brigade in Satsuma rebellion, 1877; promoted for loyalty and, 1880, became Minister of War, but took field in war with China, 1894–95, as commander of second army, and captured Kinchow, Talienwan, Port Arthur, and Wei-hai-Wei. He was now created marquis and given special rank of field marshal with Yamagata; in war with Russia, 1904–5, was commander in chief in Manchuria and defeated Russians at Liau-yang, the Shahs, and Mukden; received order of merit, resigned as chief of general staff, created prince—all 1906. His wife, Stematz Yamakana, was graduated at Vassar.

O'yer and Ter'miner ("to hear and determine"), name of the commission by virtue of which judges in England take cognizance of and try criminal offenses. The words were used in the commission when it was written in Norman French. Courts for the trial of criminal causes in some of the U. S. are designated courts of oyer and terminer.

Oys'ter, a mollusc allied to the mussels, etc. It belongs to the genus *Ostrea*, family *Ostreidæ*, which have a shell one half or valve of which is larger than the other. There are about seventy recent species. The shell may be free, attached to rocks, etc., or imbedded in the mud, is closed by a single muscle. The oyster has no mouth, but a fringe which collects the food along the entire shell opening. The fry or fertilized ova of the oyster are termed "spat," and are largely produced from May to September, the spawning season. The European species is hermaphroditic; in the American species the sexes are separate. The embryo consists of a little body enclosed in a small but perfect shell. At first it swims about; then becomes attached. In three years it attains its full growth. In the U. S. the oyster beds of Chesapeake Bay, Virginia, Georgia, and Long Island are celebrated; in England the Gravesend beds and those along the coasts of Essex and Kent; in France those of Rochelle, Rochefort, Ré, Oléron, Cancale, and Granville. The most common American species is *O. virginiana*, found along the Atlantic coast of N. America. The most favorable locality for oyster beds is one where the currents are not too strong, and where the sea bed is shelving and covered by mud and gravel. Oysters are collected by dredging.

The U. S., Great Britain, and France are the chief seats of the oyster industry. Large quantities of American oysters are now exported to Europe, the American species being generally larger than the European. In Europe oyster fishery has become oyster culture, the young oysters being collected upon tiles or hurdles and laid down in artificial ponds. The pearl oyster (*Meleagrina margaritifera*) of the Indian and Pacific oceans belongs to a different family. The value of the U. S. oyster crop of 1909 was nearly $20,000,000; Great Britain coming next with a crop value of about $6,000,000; France with $5,000,000.



OYSTER CATCHER.

Oyster Catch'er, wading bird of the genus *Hæmatopus*, which feeds on small oysters and

other molluscs. There are six or eight widely scattered species, all recognized by their stout, brightly colored, compressed bills, and striking black and white plumage, whence the English name of sea pie. The American oyster catcher (*H. palliatus*) is about 18 in. long.

Oyster Green, marine algæ of the genus *Ulva,* also called GREEN LAVER and SEA LETTUCE. There are several species of *Ulva* common to both shores of the Atlantic, the most abundant on the U. S. coast being *U. latissima* and *U. lactuca*; from 3 in. to 2 ft. long, and 3 to 12 in. broad; very thin, smooth, and glassy, they appear like very fine bright green silk. The plants are common on oyster beds, and are frequently used by dealers to decorate their heaps of oysters. The plant is the most valuable seaweed for a salt-water aquarium, it being one of the few that will thrive and give off oxygen in the quiet waters of a marine tank.

Oyster Plant. See SALSIFY.

Oyster, Vegetable. See SALSIFY.

Ozark' Moun'tains, series of steep and heavily timbered ridges of S. Missouri, extending into Arkansas and the Indian Territory. They are nowhere of great elevation. They are believed to possess great mineral wealth.

Oze'na, disease of the nose, characterized by a discharge of fetid muco-purulent matter from the nostril. Any case of chronic catarrh of the nose may become ozena if the condition of the patient is depressed. It may depend upon caries, and may be a symptom of cancer, syphilis, glanders, or scurvy. It often follows scarlatina, or even a severe cold. General tonic treatment, good food, and weak local disinfectants are indicated in simple ozena.

Ozocerite, or **Ozokerite** (ō-zō-sē'rīt), brownish-yellow, waxlike fossil resin found in bituminous sandstones. The largest deposits are in Moldavia and in Utah. In combination with India rubber, asbestos, etc., it is used to insulate electrical conductors.

O'zone, modification of oxygen which stands almost if not altogether alone in some respects. Modifications in the physical properties, but not in the substance of solid and liquid substances are common, but those of gaseous bodies are little known, ozone being the only one that has been at all studied. As in the case of all physical changes, when oxygen passes to the form of ozone there is found to be a change of volume. Ozone is formed when oxygen is submitted to various agents and operations. The electric spark and the slow oxidation of phosphorus are two of the most familiar. The oxygen formed by electrolysis contains it; also that evolved from a mixture of sulphuric acid and permanganate of potash. It is found in country and sea airs. It is always readily detectable, when masking odors are absent, by a singular and characteristic odor, which, once perceived, is always recognizable again. It possesses the properties of oxygen in an intensified degree and purifies air and water.

P

P, sixteenth letter and twelfth consonant of the English alphabet; is the leading or most prominent of the labial mutes; pronounced by closely compressing the lips until the breath is collected and then letting it issue. See ABBREVIATIONS.

Paca (pä'kä), **William,** 1740–99; American jurist; b. Wye Hall, Harford Co., Md.; became a lawyer at Annapolis, Md.; in Congress, 1774–79 and 1786; signed the Declaration of Independence; in state senate, 1777–79; chief justice of Maryland, 1778–80; chief justice of the state Court of Appeals for admiralty and prize cases, 1780–82; Governor of Maryland, 1782, 1786; in convention of 1788, which ratified the U. S. Constitution; U. S. district judge, 1789–99.

Paca (pä'kä), one of the largest of rodent mammals (*Cœlogenys paca*), native of S. and Central America; 2 ft. long and generally dark brown with streaks and patches of white. It is destructive to sugar cane and other growing crops, burrows in the earth, and is remarkably cleanly in its habits. It is valued as food, but is usually very fat and oily. Its fur is worthless, but its thick skin makes a good leather.

Pacchioni (päk-kyō'nē), **Antonio,** 1665–1726; Italian anatomist; b. Reggio; was early associated with Malpighi in practice of medicine; made many original researches in anatomy, particularly on the brain and its membranes. His name is perpetuated in the *glandulæ Pacchioni,* small rounded bodies adhering to the membranes of the brain along the course of the great longitudinal fissure.

Pachyderma'ta (Greek, "thick skin"), name applied by Cuvier to an order containing the horses, tapirs, pigs, elephants, and related forms, including all nonruminating ungulates. The sea cows, and even the walrus, have been placed in this "order," but the members of this heterogeneous group are now distributed in other orders.

Pacif'ic O'cean (formerly called also the SOUTH SEA), that part of the aqueous envelope of the earth which separates America from Asia and the E. Indies; the most extensive and the deepest of the oceans. On the S. it merges with the S. ocean, the parallel of 40° being its arbitrary limit. On the N. and E. it is separated from Asia and the Indian Ocean by a chain of seas more or less enclosed by islands and peninsulas. These—the Bering, Okhotsk, Japan, Yellow, China, Sulu, Celebes, Banda, Java, and Arafura seas—are all regarded as its dependencies. The ocean proper has an area of 50,000,000 sq. m., or three eighths

of the water surface of the globe; with its dependencies, 55,500,000, or two fifths. Its mean depth is 2,475 fathoms, and it contains about three sevenths of the water of the globe. Counting also the dependencies, the mean depth is 2,285 fathoms, and the ratio of volume five elevenths. The mean depth is also the general depth, three fourths of the bottom lying between the planes of 2,000 and 3,000 fathoms. The greatest known depth (1908) is 5,269 fathoms, 70 m. SE. of Guam. The parts lying N. and S. of the equator are called respectively the N. Pacific and the S. Pacific, and though the assumed dividing line is arbitrary, it coincides approximately with a natural division related to the system of currents. Each part has its own great eddy, set in motion by the planetary winds, and the reverse current which separates these lies but a few degrees N. of the equator.

In the N. Pacific a great current runs W. in the tropics, another great current E. in the temperate zone, and the circuit is completed by a S. current along the California coast and a N. current along the coasts of the Philippine and Japanese islands. The heat-bearing N. current is known along the coast of Japan as the Kuro Siwa, and is the counterpart of that portion of the N. Atlantic circulation called the Gulf Stream. NE. of the principal eddy is a secondary eddy occupying the Gulf of Alaska. It follows the Alaskan coast from Charlotte Island N., W., and SW. to the vicinity of Unalaska, where it turns to the S. and E. A monsoon current, following the coast of Central America and S. Mexico, runs to the NW. in summer and is reversed in winter. The great eddy of the S. Pacific flows W. near the equator and E. in middle temperate latitudes, where it joins with the circumpolar eddy of the S. ocean and follows the S. American coast N. to Cape Blanco. The return S. current is divided by the islands into many streams, and a distinct eddy is recognized between Australia and New Zealand. This is not a reverse eddy, like that of the Alaskan Gulf, but turns from right to left like the great eddy with which it is associated.

The Pacific is distinguished by the abundance of islands, pelagic and continental. The pelagic, which are of great number, are of small extent, and are the summits of conical volcanic mountains built by submarine eruption from the bottom of the sea. Many of those lying within the tropics are capped or surrounded by coral reefs. The continental islands, containing not only volcanic but sedimentary rocks, are for the most part of greater extent and are grouped about the margin. The first Europeans to discover the Pacific were Balboa and his party, who in 1513 sighted it from the summit of the Isthmus of Darien. Magellan crossed it from E. to W., 1520–21.

Pacto'lus, small stream, barely 10 ft. wide and a foot deep, of Lydia, Asia Minor, which flows from Mount Tmolus into the Hermus; formerly famous for the gold contained in its mud; was the mythical source of the wealth of Crœsus; but for many centuries no gold has been obtained here.

Paderewski (pä-dĕ-rĕf'skē), **Ignace Jan,** 1860– ; Polish pianist; b. Podolia; began to play when three years old; when eighteen was nominated professor in the Warsaw Conservatory; 1884 abandoned teaching; took a course of three years' study at Vienna. He made his début as a professional pianist, 1887, in Vienna; beginning 1891, made several concert tours in the U. S.; composer of many pieces for the piano, including "Minuet," "Dans le Desert," "Chants du Voyageur," "Danses Polonaises," etc, and of a successful opera, "Manru."

As soon as the World War began to show a widespread range the man who had charmed the world by his piano recitals discerned a long looked-for opportunity to secure the absolute freedom of his beloved Poland. To the surprise of those who knew him only as a marvelous pianist and a charming gentleman, he soon developed a high grade of statesmanship, and in Jan. 1919, he became the Premier and Foreign Minister of the new republic of Poland, to which Germany ceded the greater part of Upper Silesia, Posen, and the province of West Prussia on the left bank of the Vistula.

Padua (păd'ū-ä), a city of Italy; 23 m. W. by S. of Venice; on two branches of the Bacchiglione; is a triangular enclosure surrounded by a wall 8¼ m. in length. The municipal palace contains the Sala della Ragione, said to be the largest vaulted room in Europe. The university was founded in 1222, but the present buildings date from the close of the fifteenth century. The Church of St. Antony (1232–1307) is surmounted by seven cupolas, the center one of which is over the chapel containing the bones of St. Antony. At the beginning of the Christian era Padua was the largest and most prosperous town of N. Italy; was plundered by Alaric and Attila; suffered varying fortunes till it was conquered by Venice, 1405; was given to Austria, 1797, which held it, except 1805–14, till 1866, when it was united to the Kingdom of Italy. Pop. (1901) 82,281.

Padu'cah, capital of McCracken Co., Ky.; at junction of Ohio and Tennessee rivers; 48 m. NE. of Cairo; in a coal, iron, agricultural, and hardwood region; is principally engaged in manufacturing, agricultural, and river trade; contains U. S. Govt. building, Illinois Central Railroad Hospital, St. Mary's Academy (Roman Catholic), separate high schools for white and colored pupils, shipbuilding plant, extensive tobacco warehouses and factories, and manufactures of furniture and farming implements. Pop. (1910) 22,760.

Pa'dus. See Po.

Pæ'an, among the ancient Greeks, a hymn of thanksgiving and joy, such as was sung especially before and after battles. The pæan was originally addressed to the Pythian Apollo, afterwards to other gods, and even to men. The word is now used to signify a loud and joyous song.

Pædogen'esis, that acceleration in the life history of certain animals (as, for instance,

the Mexican axolotl and certain flies—*Cecidomyidæ*) in which the larvæ are capable of reproduction. In the latter forms the larvæ produce other larvæ, which feed on the parent, and eventually escape from the body by its complete destruction.

Pæstum (pēs'tŭm), modern Italian, PESTO, ancient town of S. Italy; on the Gulf of Salerno; 40 m. SE. of Naples; originally a Greek colony from Sybaris, called Posidonia; was afterwards taken by the Lucanians, who named it *Pæstum*; then by the Romans, and was finally burned by the Saracens in the ninth century. The ruined walls form a pentagon 3 m. in circumference; one of the E. gates still exists, and an old street of tombs is traceable beyond the ruins of another. Three very ancient Doric temples remain in a good state of preservation. The largest, that of Neptune, is pure in style, 196 ft. in length and 79 ft. in width, with a peristyle of 36 fluted columns.

Paez (pä-ēth'), **Francisco**, 1564–1620; Spanish Jesuit missionary; 1588 was sent from Goa to direct a mission in Abyssinia, and on the voyage he and a fellow missionary, Montserrat, were made prisoners by an Arab pirate and carried to Sana, capital of Yemen. There they passed seven years, and were ransomed 1596. In 1603 he reached Massowa, where he learned the native language, and met with such success that the Abyssinian King, Za-Denghel, wrote to the pope and to Philip III of Spain for more missionaries. Father Paez discovered the sources of the Abai, the E. upper branch of the Blue Nile.

Paganini (pä-gä-nē'nē), **Nicolo**, 1784–1840; Italian violinist; b. Genoa; gave, when nine years old, his first public concert in his native city; was first violinist to the Princess Eliza of Lucca, sister of Napoleon; 1828–33 made a concert tour from Vienna through Germany, to Paris and London, astonishing everyone by his extraordinary playing; compositions, of which the "Carnival of Venice" is one of the most famous, include a sonata, "Napoleon," composed for one string.

Pa'ganism, name for heathenism, now used as a general term including all polytheistic religions in opposition to Christianity, Judaism, and Mohammedanism; in the Middle Ages it also included Mohammedanism. In Germany it is also applied to tendencies within Christianity itself which are deemed polytheistic in their nature, such as the worship of the Virgin and the saints in the Roman Catholic Church.

Pagès (pä-zhäs'). See GARNIER-PAGÈS.

Paget (păj'ĕt), **Sir James**, 1814–99; English surgeon; b. Yarmouth; 1836 became a member and, 1843, a fellow of the Royal College of Surgeons; assistant surgeon, surgeon, and consulting surgeon to St. Bartholomew's; surgeon to the Prince of Wales; vice chancellor of the Univ. of London; president of the Royal College of Surgeons; his "Lectures on Surgical Pathology" passed through many editions.

Pago'da, name applied to a great variety of towerlike, many-storied buildings in the E. Indies, China, Japan, etc., used originally to contain relics and other objects of veneration or worship.

Pago Pago (pä'gō pä'gō). See PANGO PANGO.

Pahlavi, or Pehlevi (pä'lä-vē), mediæval Persian of Sassanian times (226–651 A.D.); in a broader sense, Persian from the period of the Achæmenidæ to the rise of the modern language after the Mohammedan conquest. In mediæval Oriental literature the appellation *Pahlavi*, owing to the greatness of the Parthian sway, is sometimes extended to denote anything ancient Persian. The restricted usage, however, limiting the application of the name to the language and writings of the Sassanian Zoroastrians down to the ninth century is the more correct, and is in modern times the general one. The Pahlavi is preserved in the form of inscriptions and in a written literature about as extensive as the Old Testament, and extending between 226 A.D. and 881 A.D. It is indispensable for the study of Zoroastrianism. The language, though it is Persian, presents a strong non-Iranian appearance; there is a curious admixture of Semitic (Aramaic) words and Iranian elements. One of the chief literary monuments of the language is the Pahlavi version of the Avesta.

Pailleron (pä-yė-rōn'), **Edouard Jules Henri**, 1834–99; French poet and dramatist; b. Paris; began life as a notary's clerk, but, 1860, appeared as an author with a volume of satiric verse, "Les Parasites," and a one-act comedy, "Le Parasite." He continued to write successfully for the theater, at first in verse, producing, among other pieces, "Le Mur mitoyen," "Le Dernier Quartier," "Le Monde où l'on s'amuse," "Les Faux Ménages," "Hélène," "L'Âge ingrat." His greatest success was made by "Le monde où l'on s'ennuie." He was elected to the Academy, 1882.

Pain, sensation of discomfort caused by disturbances of the sensory nerves which cause overexcitement. Any of our sensations may become painful if the stimulus is sufficiently strong and prolonged; moderate light does not prove of discomfort to the normal eye, but if intense the pain may be severe. Pain may be caused by mechanical, thermal, chemical, electrical, or other means, but it is generally due to injuries, or to disorders of nutrition, or to inflammation. There are many varieties: it may be sharp and shooting, as in neuralgias; sharp and intermittent, as in colic; sharp, severe, and constant, as in peritonitis; dull and gnawing, as in inflammation of the bowels; throbbing, as in toothache; burning, as in inflammations; pressing or boring, as headaches, etc. Some nerves are infinitely more sensitive than others. The exquisiteness of the pain when the nerves of the teeth or ear are affected is not equaled by that produced in any other part of the body. Irritation of a sensory nerve at any part gives rise to sensations of pain which are referred to the peripheral distribution of that nerve; thus people who have suffered the loss of arms or legs often experience pain just as though the sensations were

actually coming from the parts that have long since been amputated; in such cases the cut ends of the nerves in the stump are excited, and the sensations thus produced are referred by the mind to the parts formerly supplied by their fibers.

Pain invariably indicates an abnormal condition, and it is one of the most potent means of nature to warn us of disordered states. Pain is relieved by various methods, the first and most important being the removal of the cause. The use of the hot-salt bag is often efficient in relieving toothache, pain in the bowels, etc.; cold is similarly but less successfully resorted to. The use of anæsthetics, narcotics, etc., is dangerous, except in the hands of a physician.

Paine, Robert Treat, 1731–1814; American jurist; b. Boston, Mass.; chaplain in the army; admitted to the bar, 1759; 1770 was prosecuting officer (in the Attorney-General's absence) of Preston and his men for the massacre at Boston; elected to the Legislature, 1773; delegate to Continental Congress, 1774–78; a signer of the Declaration of Independence; Attorney-General of Massachusetts, 1780–90, and Judge of the Supreme Court of Massachusetts, 1790–1804.

Paine, Thomas, 1737–1809; American political writer; b. Thetford, England; was successively a staymaker, school teacher, exciseman, and tobacconist; emigrated to America, 1774, and settled in Philadelphia; edited the *Pennsylvania Magazine;* published, January 10, 1776, his celebrated pamphlet "Common Sense" (120,000 copies were sold in the first three months), which advocated independence and a republican government. During the Revolutionary War Paine published *The Crisis,* a periodical which had great influence in maintaining the spirit of the army and of the people. He was secretary to the Committee of Foreign Affairs, 1777–79; dismissed and censured by Congress for revealing diplomatic secrets in a controversy with Silas Deane; went to France with Col. Laurens, whom he aided in negotiating a loan, 1781; received from Congress a grant of money, from the State of New York an estate at New Rochelle, and from Pennsylvania £500 as rewards for his services.

He published in London, 1791–92, in reply to Burke, his "Rights of Man," a vindication of the French Revolution; was made a citizen of France and elected to the National Convention, 1792; usually acted with the Girondists; opposed the execution of the king. The faction of Robespierre imprisoned him, December 28, 1793. While in prison he finished his "Age of Reason." Narrowly escaping the guillotine, Paine again took his seat in the convention; resided nearly two years in the family of James Monroe, then Minister to France. He returned to the United States, 1802; was cordially received at Washington, Philadelphia, and New York, and by Jefferson at Monticello, but insulted by the Federalists at Trenton and elsewhere; and deprecated by the religious public on account of his deism, passed his closing years in retirement. He was buried at New Rochelle, where a monument was erected by his admirers, 1839, though his remains were carried to England, 1819, by William Cobbett.

Paint, name generally limited to mixtures of insoluble colors or pigments with certain materials which prepare them for application to surfaces of wood, iron, stone, plaster, canvas, etc., by the aid of a brush. When the colors are soluble the preparation is more properly a stain or a dye. All paints consist essentially of two parts: (1) the pigment; (2) the vehicle. *The pigments* are varied in character; the whites are generally white lead, more or less adulterated with barytes, oxide of zinc, prepared chalk, etc.; the yellows are ochers, chromate of lead, etc.; the reds are red oxide of lead, ochers, oxides of iron, red oxide of copper, vermilion, dichromate of lead, carmine, madder, and other lakes, etc.; the blues are Prussian blue, ultramarine, smalt, Thénard's blue, verditer, etc.; the greens are verdigris, Paris green, verditer, borate of copper, chromate of copper, oxide of chromium, cobalt green, and green lakes, the most common being, however, a mixture of chrome yellow and Prussian blue; the browns are umber, bole, terra di Siena, bister, sepia, etc.; the blacks are lampblack, boneblack, anthracite, graphite, etc.

The vehicles determine the character of the paint: there are oil paints and water colors. The most common vehicle is linseed oil, especially valuable on account of the property it possesses of oxidizing to a resinous body, which holds the paint in a firm waterproof varnish. For many purposes paints are prepared with the aid of water as a vehicle, glue or gum being added to make the pigments adhere after the evaporation of the water. Such paints can only be used for interior work, walls, and ceilings, for coloring pictures, maps, etc. Artists' colors are composed of very carefully prepared pigments ground in a small quantity of very fine oil, and put up in metallic tubes. *Luminous paint* is made by mixing with the ordinary articles some phosphorescent powder, which emits light in the dark.

Paint'er's Cream, mixture of mastic, lead acetate, nut oil, and water, applied by artists to unfinished oil paintings to prevent drying during the interruptions of the work. It is applied with a brush and washed off with water.

Paint'ing, as a fine art, consists of drawing, invention, relief, perspective, and color (in the modern artistic sense), and history shows that its development has taken place in the above-mentioned order. Drawing consists not only in outline, but in the correct form of any surface expressed by the pencil or brush. It is form, as distinct from color. Invention is the method with which the artist disposes his figures in order to explain his meaning, to tell his story —the variety of gesture, pose, expression, drapery, and accessory. Relief is that management of light and shade which gives the pictured figure the appearance of standing out from its surroundings and background. Perspective is the application of geometry to the art in representing streets, buildings, galleries,

and interiors by mathematical rules. Color is intimately connected with light and shade (chiaroscuro); for until the gradations and alterations of tone made by it are recognized, color may be ornamental, but never artistic. It consists of harmony, opposition, sentiment, and truth, and is never seen except when art has arrived at its highest state. Color is the luxury of art, and usually precedes its decadence.

The oldest examples of pictures have been found on the walls in the tombs of Thebes, on mummy cases, and on pottery. They comprise a multitude of domestic, historic, and mythologic subjects, are spirited in action, aiming at accuracy of representation, and showing much invention in grotesque forms of animals, ornaments, and symbols. They consist of a simple outline filled in with flat tints, making a solid figure or monochrome, without lights, shades, or any attempt at background other than the color of the substance painted upon. The pigments used are black, white, yellow, red, brown, blue, green, and also gilding. A more intellectual people was needed before painting could rise to a higher plane, but Egypt taught the first lesson. It was in Etruria that Egyptian forms were gradually improved upon. This improvement can be traced on their terra-cotta vases dating from 700 to 200 B.C., rising from the rudest shapes and designs to the most elegant and artistic. The first have simple objects, wreaths, flowers, animals, painted in a uniform color on a ground of a different tint, chiefly brown on ash color. In 600 B.C. figures are introduced, brown on cream color; a little later black, white, and crimson figures appear with incised outlines. At the date of 450 B.C. we have black figures with a red ground, the flesh of women white, also black glazed vases with figures of red, white, and blue, the colors harmonious and ornamental, though never seeking to imitate nature, except in the few attempts of representing flesh as white, and with no light and shade.

The earliest art of the Greeks was very rude; they were obliged to write at the bottom of their pictures the name of the object represented. Tradition designates Eumaras the Athenian as the first who distinguished the sexes; Cimon of Cleone, who attempted foreshortening, painted the veins, muscles, and articulations of the joints, and gave to draperies their natural folds; Panænus, who painted portraits in his battle pieces; Polygnotus of Thasus, who observed expression and grace, making the lips smile and the draperies fly, ornamenting and arranging the hair; Apollodorus of Athens, celebrated for color, light, and shade. He was one of the great pioneers of the art, and lived abt. 376 B.C. Zeuxis next appeared, celebrated for natural color, or close imitation of color; Parrphasius, the first who succeeded in giving his figures relief, observing manners, customs, and passions with the mind of a philosopher, and delineating the same in his pictures, for which he first made designs on parchment with pen and ink; Pamphilus applied perspective to painting and founded an academy; Apelles, the Raphael of his age, seized that undefinable quality called grace; Calades preferred subjects from ordinary life rather than from history or fable, and painted small pictures, and Marcus Ludius was a celebrated landscape painter. The Romans conquered pictures rather than made them. Less ideal than the Greeks, they excelled in portraiture, and in their compositions express more movement. Their art being but a reflex of that of Greece, it could scarcely be called national. The Byzantine period came next, through which art languished, shackled by traditions to which it was unable to give life. But finally, the old civilizations being ended and a new one established, its demand for expression formed a third great era in painting, called the Renaissance.

The building of the Cathedral of Pisa in 1063, and of St. Mark's at Venice, brought many Byzantine artists into Italy. From this beginning came the school of Italy. Cimabue (1240–1300) was the first to make any noticeable change in the old manner, throwing off the yoke of arbitrary forms and going to nature for his inspiration. The three centuries from this date are reckoned the period of the greatest artistic activity the world has known. Oil was made available for the painter's use in 1410 by John Van Eyck. Perspective was again practiced about 1464, anatomy was thoroughly investigated and applied to art by Da Vinci and Michael Angelo, and painting on glass reached great perfection. Every Italian city had its school of painting. That of Florence attained its highest perfection in Da Vinci (1445–1520) and Michael Angelo (1474–1564). The Roman school found its glory in Raphael (1483–1520). Bologna had Guido Reni (1575–1642). Parma is known by Correggio (1494–1534). Naples, Genoa, Mantua, Cremona, and Milan all had their schools and their masters. Venice, latest in date, and consequently most perfect in the mechanical parts of the art, uniting sentiment with color in Titian (1480–1576), and Greek appreciation of pure nature, the dignity of humanity, and the beauty of color in Paul Veronese (1530–88). The German school, with Albrecht Dürer (1471–1528), is noted for its close adherence to nature. The Flemish school, with Rubens (1577–1640), shows great wealth of color with poverty of ideas. The Dutch school, with Rembrandt (1606–74), also shows grace and poetry of color, but lacks refinement of subject. The Spanish school is refined, dignified, good in color and drawing, lending to a borrowed manner an originality of treatment, which gives it the right to be called a national school. Ribera (d. 1655), Zurbaran (1598–1662), Velasquez (1594–1660), and Murillo (1613–85) are its shining lights. The school of Munich of the present day takes the Roman for its model, Düsseldorf imitates the Florentine, Antwerp the Venetian; France is eclectic, and has followers of every school. See DRAWING; FINE ARTS; WATER COLOR PAINTING.

Paisley (pāz'lĭ), manufacturing town of Renfrewshire, Scotland; on both banks of the White Cart, 3 m. above its junction with the Clyde; 8 m. W. by S. of Glasgow; notable modern buildings include the Coats Free Li-

brary and Museum, with observatory and picture gallery, and the Coats Memorial Baptist Church. Its celebrated manufacture of fine shawls was introduced abt. 1800. Among its other productions are silk gauze, muslins, plaids, carpets, leather, soap, and liquors. There are shipbuilding yards on the Cart. The town owes its existence to a priory founded abt. 1160. Pop. (1908) 90,305.

Paixhans (pā-zăn'), **Henri Joseph,** 1783–1854; French inventor; b. Metz; served in the artillery; became a general of division; was a deputy, 1830–48; and was connected with the ministry of war in various capacities. The guns and projectiles which bear his name were first employed in France, 1824. His chief work is Nouvelle force maritime."

Pak'tong, name of Chinese alloy resembling German silver in appearance; commercially known as *packfong*; is composed of arsenic and copper fused at a low temperature, two parts of arsenic to five of copper.

Paladilhe (pă-lă-dēy'), **Émile,** 1844– ; French composer; b. Montpellier; entered the Paris Conservatory when nine years of age; gained first prize, 1857, and Prix de Rome, 1860; won considerable fame as a composer of operas, the most important of which is his grand opera "Patrie," text from Sardou's drama, produced at the Opera, Paris, December 20, 1886. He has also composed a symphony, masses, and much music for vocal and instrumental solos.

Palacky (pă-läts'kē), **Frantisek,** 1798–1876; Bohemian historian; b. Moravia. In 1829 he became national historiographer, and began his "History of Bohemia," on which his fame chiefly rests, though he published other important works. In the Austrian Upper House and in the Provincial Diet of Bohemia he was for years the leader of the Czech National Party.

Palæog'raphy. See PALEOGRAPHY.

Palæol'ogus, name of a Byzantine family which occupied the throne of Constantinople from 1261 to 1453, the year in which that city was taken by the Turks. The first emperor of the family was Michael VIII, who had made himself Emperor of Nicæa by deposing his ward, John Lascaris, and, with the aid of the Genoese navy, obtained possession of Constantinople, and founded the dynasty. He was successful in many enterprises, endeavored to heal the schism in the Church, and died, 1282. The last emperor, Constantine XIII, was killed while fighting in defense of his capital. A branch of the family ruled the principality of Montferrat, Italy, 1305–1533, and another reigned in the Morea, 1380–1460. The family is supposed to have become extinct with Theodore Palæologus, who died in England, 1693.

Palæontol'ogy. See PALEONTOLOGY.

Palaihnihans (pă-līh'nĭ-hănz), **or Pit Riv'er In'dians** (called also PALAIKS), members of family of N. American Indians, having as their habitat the territory drained by Pit River and its tributaries from Goose Lake to the mouth of Squaw Creek, in Modoc, Lassen, Shasta, and Siskiyou cos., Cal. The following tribal divisions are recognized: Achomawi, Atuamih, Chumawa, Estakewach, Hantewa, Humawhi, Ilmawi, Pakamalli (?). Very few of these Indians survive.

Palame'des, legendary Greek hero, son of Nauplius and Clymene; served in the expedition against Troy, and for a time was commander in chief in place of Agamemnon, whose measures he opposed. He is variously said to have been drowned, and to have been executed on false evidence of treason contrived by Ulysses; is not mentioned by Homer, but was made the subject of tragedies by Æschylus, Sophocles, and Euripides.

Palanquin (păl-ăn-kēn'), portable litter for conveying travelers. Palanquins are employed extensively in India, China, and other Asiatic countries. The Japanese *norimono* and *kago* are but forms of the palanquin. The Indian palanquin has a waterproof cover, with Venetian shutters at the sides. The traveler is carried in a recumbent posture. The palanquin is borne by four men, who are relieved at regular intervals by others.

Pal'atals, sounds formed between the body of the tongue and the hard palate; distinguished from the velars or gutturals, formed between the back of the tongue and the soft palate. Palatal explosives are *k* (as in *kiss*, not as in *cot*) and *g* (as in *get*, not as in *got*). Palatal spirants are *ch* (as in German *ich*) and the voiced variety of the same (as in German *lege, folge, regnen*). The palatal semivowel *y*, in English *yet, young, onion, use*, approaches near to the character of a voiced palatal spirant, and is more accurately classified as such. The palatal vowels are the various forms of *e* (as in *ten, bat, bait*) and of *i* (as *it, bit, beet*).

Pal'ate, bony and muscular partition which separates the mouth in vertebrate animals from the anterior and posterior nasal cavities; forms the roof of the mouth; and consists of the horizontal portion of the superior maxillary bones in front and of the palate bones behind; these form an arch, bounded in front and on the sides by the upper teeth and their sockets, covered by mucous membrane, and giving attachment posteriorly to the *velum palati* or soft palate. The width, contractions, elevations, extent, and perforation by larger or smaller incisive or other openings, are valuable characters in estimating the rank of the various subdivisions of vertebrates, those being the highest in which this part is broadest, uniform, and least pierced by foramina, making a complete partition as in man; the changes in the palate bones are connected with corresponding modifications in the sphenoid, and consequently with the whole anatomy of the skull. The soft palate is a movable muscular partition, covered by mucous membrane; its free edge floats above the base of the tongue, having in its center a conical appendage, the *uvula*, and on its sides the so-called "palatine arches," of which there are two on each side, the anterior and the posterior.

Palat'inate, The (in German, **Pfalz**), formerly a political division and independent state of Germany, consisted of two separate territories, the Upper Palatinate, later forming the N. part of the Kingdom of Bavaria, and the Lower Palatinate, on both sides of the Rhine, later forming the S. part of Rhenish Prussia, the N. part of the grand duchy of Baden, and the province of Bavaria, called Rhenish Bavaria. From the eleventh century these two territories formed an hereditary monarchy, their ruler being one of the electors of the German empire; but, 1648, by the Treaty of Westphalia, the Upper Palatinate fell to Bavaria while the Lower Palatinate continued a possession of the original dynasty. In 1777 the male line of Bavaria having become extinct, the two Palatinates were reunited, but at the Peace of Lunéville, 1801, the Lower Palatinate was divided between Hesse-Darmstadt, Baden, France, Leiningen-Dachsburg, and Nassau, and the only alteration which the Congress of Vienna made in this arrangement consisted in transferring to Germany that part of the Palatinate which France had occupied, Bavaria receiving the larger part and Hesse-Darmstadt and Prussia obtaining the rest.

Pal'atine, under the old Hungarian constitution, the title of the royal lieutenant. The Archduke Stephen, cousin of Emperor Ferdinand, was the last palatine, officiating at the beginning of the Revolution of 1848. The term was also used as a title of the governors of provinces of independent Poland. Under the Merovingians the counts palatine were attached to the court and palace of the sovereign, and aided him in his judicial duties, but from the time of Charlemagne this title was given to powerful feudal lords who were placed in charge of remote or turbulent provinces, where they maintained a court and palace in the sovereign's name. This was the origin of the counties palatine.

Palatine Hill, one of the most important of the seven hills of ancient Rome; site of *Roma Quadrata,* the original city; is S. of the Capitoline Hill and SW. of the Forum; was the official abode of the emperors, and in mediæval times of the highest dignitaries, but has since then fallen into decay.

Pale, I'rish. See **English Pale.**

Palembang (pä-lĕm-bäng'), capital of Dutch residency of same name; on E. coast of Sumatra; chief trade center of island; on Moesi River, which forms a fine harbor. City has abt. 50,000 inhabitants and carries on an active trade.

Paleog'raphy, science of ancient handwriting; founded by Jean Mabillon. Paleography has to do with manuscripts, as epigraphy with inscriptions; it teaches how to decipher them and to judge of the time and place of their writing. It includes in its scope all handwritings, Oriental and Occidental; but its chief concern has been with manuscripts written in the Greek or Latin alphabet.

Paleontol'ogy, science which treats of the evidences of organic life on the earth during the past geological periods. These evidences consist in the remains of plants and animals preserved in the rocky strata or on their surfaces, and in trails, footprints, burrows, and organic material. From remote times men had observed these objects in the rocky strata, far above the level of the ocean. It was only in the beginning of the sixteenth century, when Christian nations turned their attention to geological phenomena, that fanciful opinions were promulgated, attributing these forms to "sports of nature," *lusus naturæ,* "the plastic force of nature," which effected these resemblances; or that, dating from the first creation, they were produced at the time of the formation of crystals or of the mountains themselves. As a branch of science distinct from zoölogy and botany, paleontology owes its origin to the recognition of fossils as the remains of extinct organisms. Cuvier is credited with having first announced the opinion that organisms distinct from the present inhabitants have lived upon the earth. This statement was founded on the study of the bones of the Siberian mammoth and of the *Elephas americanus,* which were shown to be specifically different from those of the living Asiatic elephant.

Paleontolgy has not only enlarged the number of species and genera, etc., of animals and plants, but it has enlarged the conception of organisms. Paleontology primarily considers organisms as having a history, while zoölogy and botany are primarily concerned with the structure and classification of organisms; thus the former science finds its legitimate field of investigation to be the history of organisms. The mere description of the fossil remains of organisms and their systematic classification is a part of zoölogy and botany, technically described as paleozoölogy and paleobotany, while paleontology proper is wider in its scope, and treats of the history of organisms, vegetable and animal. As botany and zoölogy treat of the characters expressed in the life of the individuals, so paleontology treats of the life of the races.

Paleozo'ic E'ra, one of the greater divisions of geologic time; preceded by the Proterozoic era and followed by the Mesozoic and Cenozoic; includes the Cambrian, Silurian, Devonian, and Carboniferous periods. See **Geology.**

Paler'mo, city of Sicily; on the N. coast; between Cape Zafferano on the E. and Monte Pellegrino on the W. The harbor lies to the N. of the town, and is sheltered by a huge mole. The Oreto, which, with its many small tributaries, waters the adjoining plain, flows into the sea near the E. angle. Among the public squares are the Villena or Vigiena, decorated with fountains and statues, and the public garden on the left of the Porta Felice, abounding in almost tropic vegetation. The favorite promenade is the Marina, running along the shore on the line of the old fortifications. The cathedral, built in the twelfth century, contains curious mediæval monuments. San Domenico is the largest church

in the city, and will hold 12,000 persons. The royal palace is in part the work of the Arabs, for whom it served as a fortified castle. Of other buildings there is the university (founded 1447), with the town library and the national library. The environs of Palermo abound in objects of interest, among them, the great Cathedral of Monreale and Monte Pellegrino, in which is the grotto of Santa Rosalia, the patroness of the city. There are manufactures of gloves, essences, and machinery; vessels annually entering the port about 3,500, with a tonnage of 1,200,000; exports, fruits, wines, silks, gloves, etc. Palermo is first known in history as a Carthaginian dependency. During the Punic wars it fell into the hands of the Romans and became a great naval station. In the fifth century A.D. it was taken by the Vandals, and was ceded by them to the Goths, who were driven out by Belisarius. In 830 it was conquered by the Saracens, who made it the capital of their Sicilian dominions. In 1071 the Normans, under Count Roger, took Palermo, and it continued the capital of the Sicilian kingdom through the Norman and Suabian dynasties. Charles of Anjou removed his court to Naples, 1269, since which time Palermo has never been a permanent royal residence. The landing of Garibaldi at Marsala, 1860, caused an uprising here, which put to flight 30,000 Bourbon troops, backed by a strong fleet; and by an enthusiastic *plébiscite* the city became a part of the new Kingdom of Italy. Pop. (1907) 309,694.

Pa'les, in Roman mythology, a divinity of flocks and shepherds, corresponding in some respects to the Greek Pan; conceived of sometimes as male and sometimes as female, although the rites of the festival Palilia considered Pales only as female. This festival was celebrated, April 21st, and was considered the birthday of Rome.

Pal'estine, country of W. Asia, now forming part of the Turkish Empire, between lat. 30° 40′ and 33° 15′ N., and lon. 33° 45′ and 36° 30′ E., bounded N. by the Lebanon Mountains, E. and S. by the desert which separates it from Arabia and Egypt, and W. by the Mediterranean; length N. and S. about 200 m., average breadth 60 m.; area, 12,000 sq. m.; pop. est. at abt. 400,000, of whom abt. 45,000 are Jews. The remnant of the Samaritans at Naples numbers only 150. The bulk of the inhabitants are a mixed race, descendants of the ancient Syrians and their Arab conquerors. The Mohammedans are the dominant and most numerous sect. The Christians are almost entirely of Syrian race. They belong mostly to the Greek Church, of which there is a patriarch at Jerusalem. The name Palestine was never applied by the ancient Hebrews to anything more than the S. portion of the coast region, Philistia; and when it occurs in the English translation of the Bible it has this sense. The earlier Greek usage was the same; but under the Romans it became the general name for the whole country of the Jews. The oldest name was the Land of Canaan, or sometimes simply Canaan, lowland, by which was meant, however, only the country W. of the Jordan, which is all that was promised to Abraham. Other Scripture names are Judea, the Land of Israel, the Land of Promise, and the Holy Land. The last name has for several centuries been more current than any other.

Modern Palestine is included in the vilayet of Syria, and contains the two subpashalics of Acre and Jerusalem. It is a "land of hills and valleys." Jaffa is now the only port, and this only allows landing by boats under favorable circumstances. From the coast the land rises rapidly to a mountainous height in the center, and declines on the other side to the low level of the desert, being cleft through the center N. and S. by the deep valley of the Jordan. The S. portion of the coast level is termed in the Scriptures the plain or low country, and the W. part of it was the abode of the Philistines. This plain is very fertile, and is covered with corn fields. N. of it is a less level and fertile plain, the Sharon of the Scriptures. Beyond Cæsarea the plain narrows until it is terminated by Mt. Carmel, N. of which lies the plain of Acre, the S. portion of ancient Phœnicia.

At the S. extremity of the Anti-Libanus, the E. range of Lebanon, rises the conical snow-clad peak of Hermon (about 10,000 ft. high), overlooking all Palestine. S. of Hermon the Anti-Libanus sinks into the hills of Galilee, and S. of these is the plain of Esdraelon, the great battle field of Jewish history. On its NE. border stands Mt. Tabor. S. of the plain of Esdraelon stretches an unbroken tract of mountains, attaining in the N. an elevation of 3,000 ft. The N. part of this region comprised Samaria, and the S. Judea. The hills of Judea are masses of barren rock, with a general height above the sea of 2,000 or 3,000 ft. On their E. face they descend abruptly to the valley of the Jordan, their general slope being furrowed by steep and rugged gorges. The W. slope is more gradual and gentle, but still difficult of passage, and the central heights of Palestine are a series of natural fastnesses of great strength. The Jordan is the only important river of Palestine. The principal lakes are the Dead Sea in the S. and the Lake of Gennesaret in the N. In many parts of the country, and especially in the valley of the Jordan and the vicinity of the Dead Sea, there are indications of volcanic origin, and earthquakes are often felt.

In the earliest times in which Palestine or Canaan becomes known to us, it was divided among various tribes, whom the Jews called collectively Canaanites. After the conquest of Canaan by the Israelites under Moses and Joshua, the land was distributed among the tribes. In the time of Christ Palestine was subject to the Romans, and the country W. of the Jordan was divided, beginning at the N., into the provinces of Galilee, Samaria, and Judea. On the other side of the Jordan the country was called Perœa, and was divided into the districts of Perœa proper, Gilead, Decapolis, Gaulonitis, Batanæa, Auranitis (with Iturœa), Trachonitis, and Abilene. The country remained subject to the Roman and Byzantine emperors for more than six centuries

after Christ. The Jews, after frequent rebellions, in one of which 70 A.D., Jerusalem was destroyed by Titus, were mostly driven from the country and scattered as slaves or exiles over the world. In 614 the Persians under Chosroes II captured Jerusalem. It was regained by Heraclius, but was conquered by the Mohammedan Arabs, 637. The crusades form a memorable period in the history of Palestine. In 1517 the Turks took the country from the Sultan of Egypt. In November and December, 1917, a British expedition under Gen. Allenby gained control of all Palestine, occupying the Holy City of Jerusalem on Dec. 9.

Palestrina (pă-lĕs-trē'nă), **Giovanni Pietro Aloisio da,** 1524–94; Italian composer; b. near Rome; made papal chapelmaster by Julius III, being the first who received that title. In 1555 Paul IV dismissed him for marrying; but he afterwards held the same post in the churches of St. John Lateran and Santa Maria Maggiore, and after 1571 in St. Peter's. Palestrina, being called on by the Council of Trent to compose a work in a more simple and devotional style than that of the prevailing music, produced his celebrated "Mass of Pope Marcellus." His music, chiefly masses, psalms, motets, and madrigals, is grave and learned.

Palestrina (ancient, *Præneste*), town in province of Rome, Italy; on a spur of the Apennines, 1,600 ft. above the sea; 18 m. NE. of Albano. The Church of Santa Rosalia is richly adorned with marbles and alabaster. The Palazzo Barberini occupies a part of the site of the vast old Temple of Fortune. Præneste was a member of the Latin League till, 499 B.C., it joined Rome; took part, however, in the Latin war against Rome. In 82 B.C. Sulla, for harboring the younger Marius, put to death more than 12,000 of its citizens. On the fall of the W. Empire it became a part of the papal dominions; but the Colonna family afterwards claimed it as their fief. In 1297 Boniface VIII utterly destroyed the town, with the exception of the cathedral. From this time the Colonna never ceased to struggle with the popes for its possession till 1630, when it passed by sale to the Barberini. Pop. (1901) 6,027.

Palffy (päl'fē), Hungarian family of German origin, founded in the eleventh century. NICHOLAS II (1550–1600) showed great prowess against the Turks. COUNT JOHN IV (1659–1751), of the Hédervár branch, restored peace in Hungary, 1711, by the Treaty of Szatmár, and was appointed governor general there by Maria Theresa, 1741.

Palgrave (päl'grāv), **Sir Francis,** 1788–1861; English author; b. London; belonged to a Jewish family named Cohen, which name he exchanged for Palgrave; studied law; 1822 employed by the Commissioners of Records, and, 1838, was appointed deputy keeper of her Majesty's public records; first became known as the editor of the *Parliamentary Writs*. In 1831 he published a pamphlet on "Conciliatory Reform" and a "History of England: the Anglo-Saxon Period." In 1832 he was knighted "for his general services and his attention to constitutional and parliamentary literature." His "Rise and Progress of the English Commonwealth" is devoted to the Anglo-Saxon polity and manners, and is especially valuable to the student of English jurisprudence; other works, "Truths and Fictions of the Middle Ages: the Merchant and the Friar," and "History of Normandy and England."

Palgrave, William Gifford, 1826–88; English author; b. Westminster; son of Sir Francis; was an officer of the native infantry in Bombay, 1847–53; entered the Roman Catholic priesthood; missionary in India, Palestine, and Syria; 1862, commissioned by Napoleon III, made a journey through the Wahabite kingdoms of central Arabia, disguised as a physician; 1864 severed his connection with the Jesuit order, and in 1865 was sent to Abyssinia by the British Govt. to negotiate with King Theodore for the release of English prisoners. Thereafter he held various consular ports, and after 1884 was minister to Uruguay. His publications include "Central and Eastern Arabia," "Essays on Eastern Questions," "Dutch Guiana," and "Alkamah's Cave, a Story of Nejd."

Pali (pä'lē), language in which the Buddhist scriptures are written; is one of the Prakrit dialects into which the old spoken Sanskrit, the Sanskrit of the Vedas, was broken during the centuries from 1000–600 B.C. while the Sanskrit-speaking Aryan tribes were gradually forcing their way from the Punjab down into the Ganges valley. It is the only one of the spoken dialects of which we have full records, and it bears the same relation to Vedic Sanskrit that Italian does to Latin. Pali literature consists of the Buddhist sacred texts and of other works by Buddhist authors—histories, poems, legends, commentaries, books on ethics, and controversial volumes on the rules of the Buddhist order. Its extent is constantly being increased, for the Pali language has spread to the Buddhists in Ceylon, Burma, and Siam, and is still used by authors who wish to be read beyond their native land.

Palikao (pä-lē-kā-ō'), **Cousin-Montauban** (Comte de), 1796–1878; French general; b. Paris; served in Spain and for twenty years in Africa; was made general, 1851. In the expedition to China, 1860, commanded the French troops, gaining the victory of Palikiaho (or Eight-mile Bridge), carried the forts of Taku, and, marching to Pekin, enforced the conditions of peace submitted by the allied powers. In 1870 succeeded M. Ollivier as premier and acted as Minister of War.

Pal'impsest, parchment which has been written on twice or oftener, the prior writing having been erased and the surface prepared for the new by rubbing. After the conquest of Egypt by the Saracens, W. Europe was cut off from the supply of papyrus, and the supply of parchment being limited, recourse was had to the erasure of ancient manuscripts. This practice, which prevailed in the West from the seventh or eighth century throughout the dark ages, and in the East, which was not deprived

of papyrus so soon, from about the eleventh century, has resulted, through the deciphering of the expunged works, in the recovery of important fragments of ancient authors, many of which would otherwise have been lost irrecoverably. Two processes were used in the preparation of palimpsests; the writing was washed off with a sponge and the parchment smoothed when dry by rubbing with pumice stone; or entire lines were scraped off with a sharp blade, or each letter was erased separately, the surface being afterwards rubbed smooth. Chemical means have been adopted in modern times to revive the erased writings of palimpsests, and many have been rendered legible; in several cases two writings have been brought to light under the superficial one. By far the greatest explorer in the field of palimpsest literature was Cardinal Angelo Mai, who published, 1814–53, many invaluable fragments of classic authors before reckoned as lost.

Palinu'rus (now CAPO PALINURO), promontory on the coast of Lucania, in the Tyrrhenian Sea, between Velia and Buxentum; received its name from Palinurus, the pilot of Æneas, who, according to tradition, was buried here. The place was twice the scene of great disasters, two large Roman fleets being wrecked on the rocky shores—one 253 B.C., the other 36 B. C.

Palisades', line of cliffs bordering the lower portion of the Hudson, opposite New York City. They have a length of about 20 m. and a general height of 300 ft.; formed by the outcrop of an inclined sheet of trap rock (diabase) which dips W. and was intruded in a molten condition between layers of sandstone and shale belonging to the Newark system, a division of the Jura-Trias. The extensive blasting of the rock for road-making material recently led the New York and New Jersey legislatures to unite in making the Palisades region a public reservation.

Palisot (pă-lē-zō'), **Ambroise Marie François Joseph Beauvois de**, 1752–1820; French naturalist; b. Arras; first naturalist to explore the Kingdom of Benin; because of failing health, he went, 1788, to Santo Domingo; became connected with the colonial council; after unsuccessful mission to Philadelphia for assistance against the revolted negroes, 1793, was imprisoned, and barely escaped being murdered; works include "Flora of Owara and Benin" and "Insects Collected in Africa and America."

Palissy (pă-lē-sē'), **Bernard**, abt. 1510–89; French potter; b. Capelle Biron, Lot-et-Garonne; apprenticed to a potter; later, on account of his knowledge of geometry, engaged for some time as a land surveyor; pursued also the arts of pottery, enameling, glass painting, etc. He experimented with enamels, and at last produced a pure white enamel which afforded a perfect ground for decorative work, now known as "Plassy-ware." In 1564 removed to Paris; was a Protestant; and twice imprisoned as a heretic. In 1588 he was thrown into the Bastile and kept there till his death. The most remarkable of his glass paintings is a representation of the "Myth of Psyche," after Raphael. Of his pottery, vases, ewers, jugs, salvers, etc., generally small in size but highly finished, collections are formed in several of the Paris museums; best-known pieces are those decorated with lizards, snakes, etc., in high relief, probably molded from the actual creatures, and colored in close imitation of nature. His writings contain many new observations on the formation of springs, the fertilizing power of marl, the best means of purifying water, etc., and on the origin and nature of fossil remains.

Palla'dio, Andrea, 1511–80; Italian architect; b. Vicenza; most famous of his works is the Rotonda Capra, known as Palladio's villa, near his native place; designed other villas and palaces in the still popular Palladian style, churches, convents, etc., in Venice and elsewhere; his treatise on architecture (1570) has been often reprinted.

Palla'dium, in Greek legends, a wooden image of Pallas or Minerva, thrown down to earth by Jupiter. It fell in the neighborhood of Troy. It was a tradition that Troy could never be taken while this image remained in the city, and therefore Ulysses and Diomedes were commissioned to steal it, and succeeded.

Palladium, silver-white to steel-gray metal of the platinum group, discovered by Wollaston, 1803, in the mixture of platinum metals (polyxene) from S. America. It has nearly the hardness of platinum, but is less ductile; specific gravity, 11.3 to 11.8; when hammered, 12. It does not fuse in ordinary furnaces, but melts in the oxyhydrogen flame and volatilizes; can be welded like iron or platinum; can be alloyed with various metals, particularly platinum, gold, silver, and copper. Some of its alloys have been used for the points of pencils and as a substitute for gold in dental work.

Palla'dius, 367–430; Christian Father; b. Galatia; Bishop of Helenopolis; Bithynia, 400, and of Aspona, Galatia, 420; wrote the "Lausiac History," a collection of biographies of hermits.

Palladius, Rutilius Taurus Æmilianus, Roman author; probably from the fourth century; wrote "On Agriculture," a work much used during the Middle Ages.

Pal'lah, fine dark-red antelope of S. Africa; has a white belly, a black mark on the croup, and black tufts on the back part of each foot; long, handsome horns, somewhat lyrate and ringed.

Pal'las, daughter of Triton and a youthful companion of Athene. Once when they were engaged in warlike sport they became angry, and Zeus, seeing that Pallas was about to strike Athene, interposed his ægis, and Pallas fell at the feet of Athene, who made an image in her honor and placed on its breast the death-dealing ægis. This statue was the Palladium cast down from heaven by Zeus.

Pallas Athe'ne. See ATHENA.

Pal'liser, Sir William, 1830–82; British inventor; b. Dublin, Ireland; served in the army, 1855–71; knighted, 1873; inventor of the Palliser projectiles for piercing armor-plated ships, and improved methods of rifling iron-wrought cannon for use in ships and on fortifications, and of converting smooth-bore cast-iron ordnance into rifled guns.

Pal'lium, in the Roman Catholic Church, a band of white lamb's wool, embroidered with purple crosses, worn on the neck by the pope and all ecclesiastics of archiepiscopal rank, including metropolitans and patriarchs; has two pendants, one hanging down the back and one down the breast of the wearer. It is the chief badge of the archbishop's authority, is granted by the pope in person, and is worn only on very solemn occasions. The pope, however, wears it continually. It is always buried with the wearer, and can never be transferred to another person.

Palm, any member of a large group of monocotyledonous trees or treelike plants, numbering 1,100 or more species, nearly all natives of tropical climates. Palms vary greatly in size, some scarcely rising above the ground, while others are 100 ft. or more in height. In their growth they first attain very nearly their full diameter, and then shoot up their cylindrical stems, which subsequently increase in

HARDY PALM.

size little or not at all. Some species, especially of the genus *Calamus* and its allies, are long, slender, prickly, climbing shrubs, often attaining a length of 300 ft. or more. The grasses possibly excepted, no other family of plants excels the palms in economic importance. Food, clothing, shelter, furniture, utensils, tools, weapons, ornaments, medicines, and intoxicating drinks are sometimes all supplied by one or more species.

The family has been separated into five subfamilies. The *Coryphinæ* include the date palm and the palmetto of the S. U. S.; the *Borassinæ*, the doum, or gingerbread palm, and the Palmyra palm, from whose juice are made wine, toddy, and sugar; the *Lepidocaryinæ*, which include the sago palms and the rattan palms; the *Ceroxylinæ*, which include the toddy palm of India, the Piassaba palm of Brazil, whose fiber is used for cordage, mats, brooms, etc., and the cocoanut palm, which yields cocoanuts; the *Phytelephantinæ*, which comprises palms yielding very hard nuts, whose endosperm resembles ivory, for which it is used as a substitute.

RATTAN PALM.

Palma (päl'mä), **Tomas Estrada,** 1835–1908; Cuban statesman; b. Bayamo; took part in the insurrection of 1868–78 and lost his estates by confiscation; was at one time a representative in the Chamber of Deputies of the Republic of Cuba; afterwards chosen Secretary of State, and soon President of the Republic; taken prisoner, 1877, and sent to Spain; on declaration of peace, 1878, was released, and went to Honduras. Removing to the U. S., he taught school at Central Valley, N. Y.; in September, 1895, was made delegate-at-large and minister plenipotentiary of the Republic of Cuba; December 31, 1901, elected first President of the new republic; failing to crush an insurrection, 1906, asked for American intervention, and resigned September 28th.

Palma, one of the Canary Islands; area, 330 sq. m.; contains the interesting extinct volcanoes Caldera and Barranco; produces good timber, and has two fine towns, St. Cruz and Los Llanos. Pop. (1900) 41,994.

Pal'mas, Cape. See CAPE PALMAS.

Palmblad (pälm'bläd), **Vilhelm Fredrik,** 1788–1852; Swedish author; b. Liljestad; 1810 began the publication of the *Phosphoros;* 1812, of the *Poetisk Kalender*, and, 1813, of the *Svensk Literaturtidende*, periodicals which had great influence in diverting Swedish literature from French to German models. He became Prof. of Greek Literature at Upsala, 1835; edited the biographical lexicon of distinguished Swedes, twenty-three volumes; wrote, besides other works, several novels, of which "Familjen Falkensvärd" and "Aurora Königsmark" are the most remarkable.

Palm Crab. See CRAB.

Palm'er, in mediæval times, a pilgrim returned or returning from the Holy Sepulcher; so called from the fact that he bore branches of palm gathered near Jericho, which were placed on the church altar after his return.

Palm'erston, Henry John Temple (Viscount and Baron Temple), 1784–1865; British statesman; b. Broadlands, Hampshire; son of an Irish peer of the family of Sir William Temple; succeeded to the title, 1802; entered Par-

liament, 1806; represented Newport, 1807–11; Cambridge Univ., 1811–31, and later Bletchingley, S. Hants, and Tiverton; Secretary of War, 1809–28; Secretary of State for Foreign Affairs, 1830–34, 1835–41, and 1846–52. He sympathized with Napoleon's *coup d'état* of 1851, and the avowal of his views resulted in his withdrawal from the Cabinet; Secretary of State for Home Affairs, 1852–55; Premier and First Lord of the Treasury, 1855–58 and 1859–65. His premiership is distinguished by the warlike spirit shown by the government in dealing with foreign affairs. In 1861 he was appointed Lord Warden of the Cinque Ports, and, 1863, was elected rector of Glasgow Univ.; buried in Westminster Abbey.

Palmet'to, small palm tree of S. Europe (*Chamærops humilis*); also any one of certain other small palms, of which the U. S. has the following: (1) *Sabal palmetto,* cabbage palmetto, found as far N. as the Cape Fear River, in sandy soil near the coast; timber

CABBAGE PALMETTO.

useful in constructing piers, since it is durable and not subject to the attack of the teredo; tree sometimes reaches the height of 50 ft.; leaves largely used in making hats. (2) *Serenoa serrulata,* saw palmetto, has a creeping stem from 5 to 8 or more ft. 6 in. in diameter, with thick clusters of fan-shaped leaves, abode of many rattlesnakes. (3) *S. adansonii,* dwarf palmetto, stemless, and has leaves 2 or 3 ft. high; covers dense patches of ground in low coast regions. (4) *Rhapidophyllum hystrix,* blue palmetto, low palm, with long-stemmed, fanlike leaves, in the axils of which are sharp, needlelike thorns.

Pal'mistry. See CHIROMANCY.

Palmit'ic Ac'id, fatty acid universally distributed in the fats of the animal and vegetable kingdoms; is a colorless solid, lighter than water, crystallizes in small shining scales, and is without odor; insoluble in water, but freely so in hot alcohol and ether. Combined with glycerin, it occurs abundantly in palm oil, the fat of certain palms, Chinese tallow, Japanese wax, and the wax of *Myrica cerifera.* It is found in butter, beeswax, spermaceti, human fat, etc.

Palm Oil, thick oil obtained from the fleshy pericarps of the fruit of *Elais guineensis* and *melanococca,* a palm tree of Africa, and to some extent from other palms; extensively imported and made into soap, candles, and glycerin, and used for lubricating purposes.

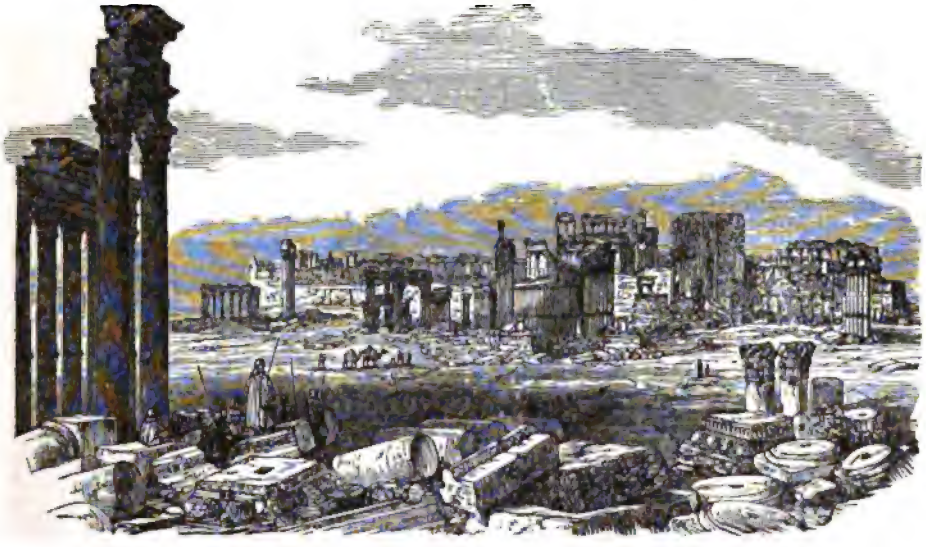
Palm Sun'day, Sunday before Easter, celebrated in the Greek, Roman Catholic, and Lutheran churches in commemoration of the triumphal entry of Christ into Jerusalem (John xii), on which occasion the multitude cast branches of trees before him. These branches are represented by sprays of palm, or, in countries where the palm does not grow, by those of other trees, as of the yew, willow, box, and fir. These branches are blessed by a priest and distributed to the congregation, who wear them for the rest of the day. The custom prevails, at least locally, of gathering and preserving the "palms," which are afterwards burned, the ashes serving for use on Ash Wednesday.

Palm Wine, or Tod'dy, alcoholic beverage prepared from the sweet sap of various species of palm; yields by distillation a stronger drink called arrack. Palm wine is much used in India and other parts of Asia; it is made in Chile, and is almost the only fermented liquor made in Africa.

Palmy'ra, ancient city of Upper Syria; in an oasis, 150 m. NE. of Damascus; founded or enlarged by Solomon (II Chron. viii, 4); formed at that time a bulwark against the Bedouin hordes of the desert; called in Scripture Tadmor. In the second century A.D. it was the commercial metropolis of N. Arabia. In the third century Odænathus, a native of Palmyra, established an independent Palmyrene kingdom, which was further extended, comprising the whole of Syria and parts of Mesopotamia, and brought to great prosperity by his widow, Queen Zenobia. Aurelian defeated her army, dissolved her empire, and captured her capital, 272. A revolt occasioned its destruction shortly after, and it never recovered, though, 527, Justinian endeavored to restore it. In 633 it was devastated by the Saracens, and again, 744. In 1400 Tamerlane completely destroyed it. A small village, Thadmor, inhabited by a few Syrian shepherds, is close by. See illustration on opposite page.

Palmyra, one of the noblest of the palm trees, the *Borassus flabelliformis* of India and Ceylon; fruit is valuable food; timber excellent; furnishes thatch, cordage, material for

hats, fans, umbrellas; leaves used for writing tablets; produces sugar and arrack abundantly. The young shoots are boiled and eaten; seeds edible; fruit yields a useful oil. This most useful tree is from 20 to 100 ft. high and very beautiful, and its leaves are generally about 4 ft. long, with stalks of about the same length.



Ruins of Palmyra.

Palpita'tion of the Heart, forcible pulsations of the heart which make themselves felt or produce unpleasant sensations; may be due to organic disease of the heart, but in most cases the heart itself will be found normal, and the cause of the palpitation will be discovered elsewhere. The most direct cause of nonorganic palpitation is pressure upon the heart by some tumor mass, or a distended stomach. Reflex excitability is furthered by causes increasing nervous instability, as the overuse of stimulants, such as tea, coffee, tobacco, and alcohol. Finally there are the cases of palpitation due to diseases of the heart itself—such as hypertrophy, valvular disease, fatty heart, etc. See Heart Disease. In the attacks of palpitation the pulse is generally rapid, from 100 to 150 per minute. These cases are designated tachycardia. Constant or frequently repeated palpitation leads to hypertrophy of the heart from overexercise, as in athletes. The treatment of palpitation varies with the cause. In nervous cases or in palpitation from fright, and the like, sedatives are called for. When the heart is weakened by organic disease digitalis and other stimulants are needed. Finally, local treatment directed to the stomach, etc., or constitutional remedies to improve the blood, or the simple correction of dietetic errors may suffice to control the tendency to palpitation.

Palsy (pâl'zĭ). See Paralysis.

Pamir (pă-mēr'), name of the elevated region in central Asia between lat. 36° and 39° N. and lon. 70° to 76° E.; politically divided between Chinese and Russian Turkestan, Bokhara, Afghanistan, and a number of petty states and independent tribes N. of the Punjab; extends from the Trans-Alai Mountains on the N. to the Hindu Kush on the S., and from the plains of Kashgar to the upper tributaries of the Oxus. It is a complex of mountains, valleys, and limited plains, all at elevations above 12,000 ft., and the mountains sometimes reaching 20,000 and 25,000 ft. The Pamir region is sometimes referred to as the "Roof of the World." It is traditionally the birthplace of the Aryan race, and some of the names of places still in use there present curious similarity to corresponding ones found in Genesis.

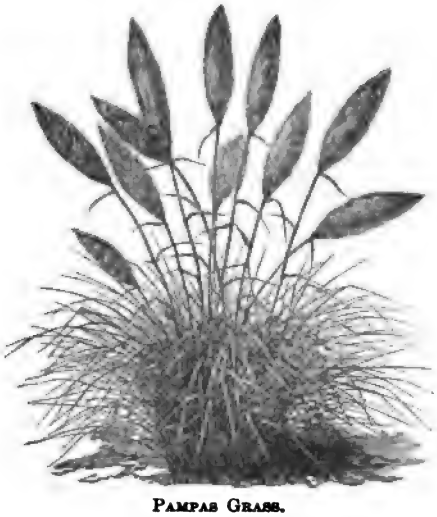
Pamir Di'alects, Iranian dialects spoken in the central Asiatic table-land, the plateau of Pamir. Most important of these is the Munji or Munjani, spoken in the region of Mungan, near Kafiristan; this tongue presents interesting resemblances to the ancient language of the Avesta.

Pam'lico Sound, largest of the sounds of N. Carolina; fenced by long low islands from the open sea, with which it communicates by Ocracoke, Hatteras, Loggerhead, New, and other inlets; 20 ft. in average depth, with great areas of shoal water; communicates with Albemarle Sound on the N. The Neuse and Pamlico are its largest tributaries.

Pam'pas, in the S. and W. parts of S. America, any large open plains or rolling lands; hence the word is synonymous, or nearly so, with the terms llanos, savannas, prairies, etc., used in other parts of America; a special geographical sense, the vast grassy plains which occupy a portion of the Argentine Republic.

Roughly defined, they comprise an area of over 300,000 sq. m., between the Paraná and the Atlantic on the E., the hills of Córdoba, San Luis, and Los Andes on the W., the Rio Salado on the N., and the Rio Negro on the S.

Pampas Grass, reedlike grass from the temperate regions of S. America, much cultivated for ornament. The recurved slender leaves are



PAMPAS GRASS.

clustered thickly at the ground. From the middle of the tuft the flowering stems rise 6 to 12 ft. high, and bear an ample silvery panicle.

Pam'philus, abt. 240–309; Syrian martyr; b. Berytus, Phœnicia; embraced Christianity; became a friend and associate of Eusebius; founded a library at Cæsarea in Palestine, which he bequeathed to the Christian church there, and suffered martyrdom.

Pamphyl'ia, ancient district of Asia Minor, extending along the Mediterranean from Cilicia on the E. to Lycia on the W.; with exception of the plain of Perge-Aspendus, it is mountainous, being covered with ramifications of the Taurus Mountains; inhabitants were composed of Greek colonists and aboriginal tribes; country belonged to the Persian Empire, and after its fall to the Macedonians. When Alexander died it fell to Syria, and became subsequently a Roman province. Its chief cities were Olbia, Attalia, Perge, Aspendus, Sylleum, and Cibyra; chief rivers, the Cestrus and Eurymedon.

Pamplo'na, or **Pampeluna** (păm-pā-lō'nă), ancient *Pompeiopolis*, capital of Navarre, Spain; on the Arga; is fortified and defended with a strong citadel; has a Gothic cathedral, natural history collection, bull ring (accommodating 8,000 spectators), magnificent aqueduct; manufactures of silk, leather, pottery, and a trade in wine. Originally a town of the Vascones, it was rebuilt by Pompey, from whom it derived its name; became capital of Navarre, 907; was held by the French, 1808–13; was a point of attack by the Carlists, 1873–76, but never taken. Pop. (1900) 30,609.

Pan, son of Hermes by a daughter of Dryops (or of Zeus by Callisto); was a genuine Greek god, originally a light god, though in poetry and art he was the patron of flocks and pasturage. Pan had goat's legs, horns, beard, tail, ears, and face; was so ugly that his mother was terrified when she first saw him; was the inventor of the syrinx and of pastoral music; had a loud voice by which he frightened the wayfarer and even put armies to flight, wherefore such sudden flight is called *panic.* He must not be confounded with the Satyrs, Sileni, or Roman Fauns.

Panama', republic in Central America; bounded W. by Costa Rica; N. by the Caribbean; E. by Colombia; S. by the Pacific; length about 480 m.; breadth, 37–110 m.; area, 31,500 sq. m.; pop. abt. 387,000, the larger part of Spanish descent; chief cities, Panama (capital), and Colon or Aspinwall, on the Atlantic coast; smaller ports, Aqua Dulce, Pedregal, Montijo, Puerto Mudis, on the Pacific; Bocas del Toro and Puerto Bello, on the Atlantic. A zone 5 m. wide on each side of the canal route was granted in perpetuity to the U. S., 1903, while for subsidiary canals other territory was ceded, and for the defense of the canal the coast line of the zone and the islands in Panama Bay were also ceded. About half the country is unsettled and peopled only by a few roving Indians. Surface generally mountainous, but immense swamps and treeless uplands are frequent, coast line rough and broken; chief rivers, the Tuira, Chagres, and Bayano.

Iron, copper, gold, salt, mercury, coal, gypsum are found. Forests are rich in cabinet woods; climate very hot on the coasts; in interior relatively cool; wet season, May to December, inclusive; miasmatic fevers prevail in certain districts. The soil is very fertile, producing bananas, coffee, cacao, caoutchouc, maize, rice, sugar cane, tobacco, vanilla, etc.; cattle raising an important industry, as is pearl fishing on the Pacific. Manufactures are insignificant; value of imports from the U. S. (1910) $5,628,000; exports to the U. S., $1,508,000; imports exclude those for canal or Panama Railroad work; chief exports, bananas, rubber, hides, mahogany, cabinet woods, vegetable ivory.

Panama was the first region in continental America settled by Europeans, and since 1535 it has had a special importance, owing to the trade across the Isthmus. The Isthmus was incorporated with the vice royalty of New Granada, 1718. It was independent, 1857–60, then became a department of the republic of Colombia. The Panama Canal Treaty with the U. S., 1903, having been rejected by the Colombian Congress, the city council of Panama, backed by the soldiers in the city, declared, November 3d, the independence of the Isthmus. The *de facto* government was recognized by the U. S., November 13th, and a treaty was concluded, November 18th, guaranteeing and agreeing to maintain the independence of the new republic.

Panama is also the name of the capital and largest city of the republic; on the Pacific side of the Isthmus, at head of Panama Bay; terminus of Panama Railway, which connects it with Colon; is the oldest city of European origin in continental America; founded by Pedro Arias Davila, 1519. The old city, 6 m. SE. of the present one, was burned by the buccaneer Henry Morgan, 1670. Panama was long the most important port on the Pacific side of Spanish America. The completion of the isthmian railway, 1855, gave it much impetus; but it suffered greatly from revolutions and destructive fires. The modern city is built on a rocky peninsula. There is no proper harbor for large vessels, and the anchorage of vessels at Flamenco Island and the wharf at La Boca, now called Port Ancon, lie within the Panama Canal zone so far as seagoing vessels are concerned. Besides the commerce in transit there is considerable trade with Central America and the Pacific ports of Colombia. Among the interesting old buildings are the cathedral (one of the largest in America), convents, the palaces of the Audiencia, and the ancient walls and fortifications, which were of great strength. Pop. abt. 20,000.

Panama, Isthmus of, is a neck of land connecting N. America with S. America, and separating the Caribbean from the Pacific. Broadly speaking, the isthmal portion of the continent includes all of Central America and S. Mexico; but the name is generally restricted to the narrow portion extending from the Bay of Chiriqui to the Atrato River. It extends from W. to E., forming a double curve; length nearly 470 m.; average width nearly 70 m. The bays of Panama and San Miguel on the S., and of Chiriqui and Uraba on the N., form three minor constrictions which bear distinctive names. Beginning at the W., the Isthmus of Chiriqui, opposite the bay of that name, has a minimum width of about 45 m. Beyond this the neck is broadened to 118 m. by the Azuero Peninsula on the S. The Bay of Panama reduces it to 31 m. opposite the Bay of San Blas, or about 35 m. between Panama and Colon; this is known as the Isthmus of Panama proper, or of San Blas. The Isthmus of Darien (a name sometimes applied to the whole neck) is properly the portion between the gulfs of Uraba and San Miguel, 35 m. in minimum width.

An irregular mountain chain, the Cordillera de Baudo, runs the whole length of the Isthmus, generally near the N. coast; W. it has volcanic peaks, said to be over 7,000 ft. high; but E. it subsides to a range of hills, with passes less than 400 ft. above sea level. It is separated from the Andes by the valley of the Atrato River, which forms the true limit of the S. American continent. Balboa, who first established the existence of the Isthmus, 1513, crossed it in the part known as the Isthmus of Darien. The difficulties of this route, and of that opposite the Bay of Chiriqui, early led to their abandonment in favor of the easier roads from Panama, by the valley of the Chagres River. This has continued to be the ordinary route across the Isthmus.

Panama Canal', ship canal across the Isthmus of Panama, connecting Colon Bay on the Atlantic with Panama Bay on the Pacific, mainly following the line of the Panama Railroad; length, 50 m. Such a canal was proposed as early as 1528; surveys were made by American and foreign engineers, 1843–75; the first practical attempt to construct a canal was made by the French engineer De Lesseps, who, 1881, organized a Universal Interoceanic Company, and obtained a concession from the Colombian Govt. Work (on a sea-level canal) was prosecuted till 1889, when, having expended $135,000,000 and wasted some $130,000,000, the company went into liquidation and suspended work. In March, 1893, an extension was granted for future work; 1894, the French investors formed a new company, subscribed $4,000,000, and obtained from Colombia a concession for ten years (extended, 1900, by six years). On January 4, 1902, the board of the company offered to sell to the U. S. all their rights and property, the French Govt. having given its consent. The U. S. Isthmian Commission then recommended this route in preference to one across Nicaragua, and the U. S. offered Colombia $7,000,000 in cash and an annuity of $600,000 in return for absolute surrender of 3 m. of land on either side of the canal, and authority over five leagues of the sea at either entrance. The Colombian Constitution forbade the leasing of territory in perpetuity, but a lease for one hundred years, renewable at the option of the U. S., was obtainable, and, January 22, 1903, a treaty between the two countries was signed. Objecting to the practical cession of sovereignty, and to the sum offered by the U. S. as too small, the Colombian Congress rejected the treaty. This action was followed by the secession of the Department of Panama. On November 18, 1903, a treaty between the U. S. and Panama was signed, insuring the construction of the canal; and, April 23, 1904, the properties of the French Canal Company were transferred to the U. S. on payment of $40,000,000 to that body.

An Isthmian Canal Commission took charge of the construction of the canal and the government of the zone, but after nearly a year of service resigned, April 3, 1905, and a new commission succeeded to its duties. A majority of the engineers recommended a sea-level canal, but June, 1906, the U. S. Congress voted in favor of a lock type. The canal was constructed on an 85-ft. level. At Gatun a duplicate flight of three locks have a lift and descent for vessels to and from a lake 30 m. long and 164 sq. m. in area, the object of this reservoir being to receive the floods of the Chagres River. A lock at San Pedro on the Pacific side has a lift and descent of 30 ft. from which point there is lake navigation at 55 ft. level for 5 m. to Sosa Hill on the shore of Panama Bay, where two duplicate locks carry vessels down to the level of the Pacific. From the Caribbean Sea to the mouth of the Mindi River the channel has a bottom width of 500 ft. and a depth of 45 ft. below mean tide. From the Mindi to the Gatun locks the width and depth

is about the same. From the Gatun locks to San Pablo, nearly 16 m., the width is about 1,000 ft. and the depth 45 ft. Farther up the lake was decreased, and from Obispo to Las Cascades, where the Culebra cut begins, is about 300 ft. Between Las Cascades and Paraiso, 4.7 m., the most difficult work of the whole construction was encountered. Along this stretch the channel is 200 ft. wide; from Paraiso to the San Pedro lock it is 300 ft. Between San Pedro and Sosa Hill the width increases from 500 to 1,000 ft. From the Sosa locks to deep water in Panama Bay, 4 m., the channel has a bottom width of 500 ft. and a depth of 50 ft. below mean tide. All the locks are in duplicate, and 1,000 ft. long and 110 ft. wide. A treaty between the U. S. and Great Britain, signed 1901, provides for the neutralization of the canal and for its use on equal terms by vessels of all nations.

The canal was officially opened for general traffic on Aug. 15, 1914. Subsequently land slides on both banks in the Culebra (renamed the Gaillard) cut caused the canal to be closed for short periods to navigation. The total cost of the work was officially reported at $353,559,050, and for its protection Congress voted $18,975,473 for defensive works at each terminus. Soon after its opening a number of vessels of considerable size passed through it in good time and without accident or delay; but the most significant evidence of its great utility was demonstrated on July 25, 1919, when four dreadnoughts of the fleet passing from the Atlantic to the Pacific were lifted successfully through the Gatun locks, the flagship being lifted out of the three locks in 1 hr. 17 m., a feat considered marvelous.

Pan-Amer'ican Con'gress, conference of representatives of the U. S. and the republics of Mexico, Central and S. America, Haiti, Santo Domingo, and Brazil, held at Washington in 1889 to discuss and recommend measures to regulate and improve the international relations, and means of direct communication between these countries. The idea of such a congress was not new. Henry Clay's scheme for a Panama congress comprised several features of the later plan, but was never carried out. To James G. Blaine more than to anyone else was due the assembling of such a body. Among the subjects discussed by the congress, without definite results, were the establishment of an international bank, the protection of copyrights and patent rights, the granting of subsidies to steamship companies, and the adoption of an extradition treaty. Among the measures which the congress voted to recommend for adoption were a uniform system of weights and measures, a uniform commercial coinage, and a common method of legalizing documents. Another important recommendation was that reciprocity treaties be adopted between the states. It adjourned April 19, 1890.

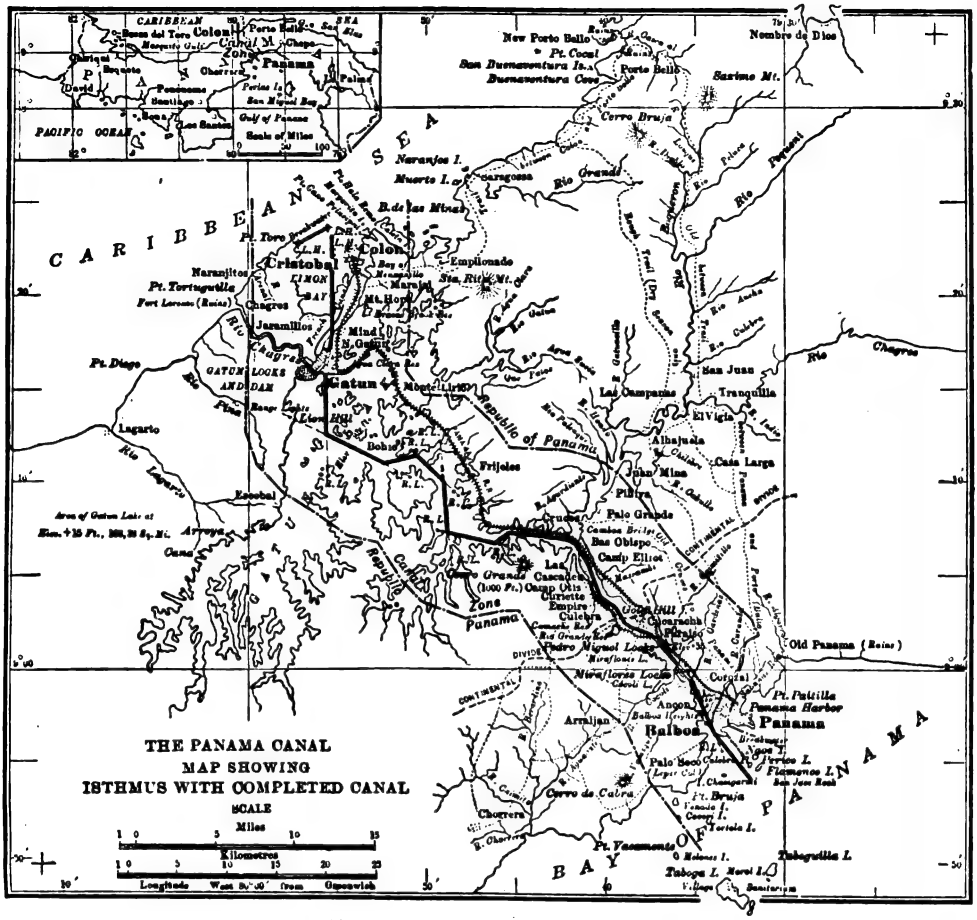
The Pan-American Congress of 1901–2 met in the city of Mexico, October, 1901. Various plans for bringing the American republics closer together were discussed, including the building of a railroad to connect N. and S. America, the adoption of a uniform coinage, and regular quarantine measures. The third Pan-American Congress met at Rio de Janeiro, Brazil, in July and August, 1906. The principal topic discussed was the Calvo or Drago Doctrine, according to which debts due by S. American countries to European nations cannot be collected by armed intervention. A fourth Congress, held at Buenos Aires in July, 1910, recommended that all American states bind themselves to submit to arbitration all claims for pecuniary damages presented by their respective citizens which cannot be settled through ordinary diplomatic channels.

Panathenæ'a, most splendid of the Athenian festivals, celebrated in honor of Athena (Minerva) Polias, protectress of the city. According to tradition, it was instituted by Erichthonius under the title of Athenæa. The celebration was confined to Athens until the reign of Theseus, who united all the Attic tribes, and this, becoming their common festival, was called Panathenæa. The festival was divided into the lesser and the greater, the former taking place every year, the latter in the third year of each Olympiad.

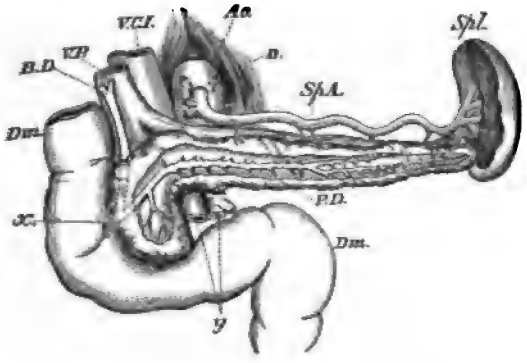
Panay (pä-nī'), island of the Philippines; extreme NW. of the Visayan group; area, mainland, 4,752 sq. m., with dependent islands, 5,103; pop. (1903) 743,646, of whom 14,933 classed as wild; comprises provinces of Antique, Capiz, and Iloilo; capitals, San José de Buenavista, Capiz, Iloilo; inhabitants, Visayans, wild Mundos, and a few Negritos; has numerous mechanical industries, large unexploited mineral resources, valuable timber, and productions of cotton, corn, pepper, coffee, tobacco, sugar cane, copra, and rice.

Panchatantra (pän-chä-tän'trä), ancient Sanskrit collection of fables and tales, of ethico-didactic purpose. The form of the teaching bears much resemblance to that of the Buddhists. The date of the extant form of the work is uncertain. The "Panchatantra," or perhaps rather the earlier but now lost original thereof, has been transmitted through translations, sometimes under the name of the "Fables of Pilpay," or "Fables of Bidpai," to almost all the peoples of Europe.

Pan'creas, or Sweet'bread, gland which in the human being is behind the stomach, extending across the abdominal cavity. It weighs from 2 to 6 oz. A small posterior part (lesser pancreas) is sometimes detached. The right extremity is called the head, the left the tail, and the rest the body. In the octopus the pancreas is a long, convoluted organ; in other mollusks it is either absent or rudimentary. Some insects have analogous organs. In the higher vertebrates there is sometimes but one duct (the canal of Wirsung), but there are very often two even in man. The minute structure and general aspect of the pancreas resemble those of the salivary glands. The secretion of the gland (pancreatic juice) is normally alkaline, viscid, and coagulable by heat. It is secreted in abundance only during digestion. It contains the principle pancreatin. Pancreatin should contain the four pancreatic


THE PANAMA CANAL
MAP SHOWING
ISTHMUS WITH COMPLETED CANAL
SCALE
Miles
Kilometres
CARIBBEAN SEA
PACIFIC OCEAN
Colon
Panama
Cristobal
Gatun
Gatun Locks
Miraflores Locks
Pedro Miguel Locks
Culebra Cut
Gatun Lake
Republic of Panama
Old Panama (Ruins)
Panama Harbor
Balboa
Taboga I.
Taboga L.
Tabogilla L.
Rio Grande
Rio Chagres
Rio Pacora
Rio Chepo
Rio Bayano
Rio Tuira
Rio Chucunaque
Rio Sucubti
Rio Paya
Rio Pucro
Rio Jaque
Rio Balsas
Rio Boquerón
Rio Sabanas
Rio Tapalisa
Rio Mamoni
Rio Pirre
Rio Tuquesa
Rio Sambu
Rio Tupisa
Rio Turbe
Rio Cañazas
Rio Santa Maria
Rio Grande
Rio Parita
Rio Cocle del Norte
Rio Cocle del Sur
Rio Antón
Rio Chame
Rio Perequeté
Rio Pacora
Rio Chagres
Rio Trinidad
Rio Indio
Rio Coclé
Rio Caimito
Rio Grande
Rio Chagres
Rio Pacora

ferments: trypsin, which digests proteids; steapsin, which splits up and emulsifies fat; amylopsin, which converts starch into sugar;



THE SPLEEN (*Spl.*) WITH THE SPLENIC ARTERY (*Sp. A.*). Below this is seen the splenic vein running to help to form the vena portæ (*V. P.*). *Ao*, the aorta; *D.*, a pillar of the diaphragm; *P. D.*, the pancreatic duct exposed by dissection in the substance of the pancreas; *Dm.*, the duodenum; *B. D.*, the biliary duct opening with the pancreatic duct at *x*; *y*, the intestinal vessels.

and a milk-curdling ferment. It is by far the most important and most useful of the digestive ferments, either when administered by the physician or when acting in the secretion of the pancreas of the individual, and is used for the purpose of peptonizing foods.

Pan'da. See AILURUS.

Pando'ra, in Greek legend, the first woman, sent by Zeus to mankind in vengeance for Prometheus's theft of the heavenly fire. Aphrodite gave her beauty, Hermes cunning, and each of the gods bestowed on her some fatal gift for the punishment of mankind. Again, it is said that the gods gave her a box full of blessings for mankind, but, prompted by curiosity, she opened the box, and all the blessings flew away except hope.

Pan'eas (modern, BANIAS). See CÆSAREA PHILIPPI.

Pangen'esis, theory of reproduction propounded by Darwin in his "Animals and Plants Under Domestication."

Pango Pango (păng'gō păng'gō), or **Pa'go Pa'go,** harbor on the S. side of Tutuila Island, Samoa; belongs to the U. S.; considered the safest and best inlet in the Samoan group.

Panini (pä-nē'nē), Sanskrit grammarian, probably of the fourth century B.C. Of his celebrated grammar Max Müller says: "It is the perfection of a merely empirical analysis of language, unsurpassed, nay, even unapproached, by anything in the grammatical literature of other nations."

Panizzi (pä-nēt'sē), **Sir Anthony,** 1797–1879; English librarian; b. Brescello, Modena; having taken part in the Piedmontese revolution of 1821, fled to England, taught Italian at Liverpool, and was Prof. of the Italian Language and Literature in London Univ., 1828–31, when he became assistant librarian of the British Museum; 1837 was appointed keeper of the printed books; 1856 succeeded Sir Henry Ellis as principal librarian.

Panjab'. See PUNJAB.

Panno'nia, province of the Roman Empire; between the Danube and the Alps; bounded N. and E. by the Danube, S. by the Save, and W. by the mountains of Noricum; was made a Roman province in the reign of Augustus, and one hundred years later was divided into Upper and Lower Pannonia. Frequent rebellions compelled the Romans to build a large number of fortresses in the country, of which Vindobona, the present Vienna, was the most remarkable. During the decline of the Roman Empire Pannonia fell into the hands of the Huns, and from them it passed successively to the Ostrogoths, Longobards, and Slavs, till, in the ninth century, the Magyars settled on it and kept it.

Panop'olis, one of the most ancient cities of Egypt; on the E. side of the Nile; contained one of the principal sanctuaries for the priapian worship of Min (whom the Greeks identified with Pan); is now a thriving town named Akhmym.

Pan'sy. See VIOLET.

Pantellaria (păn-tĕl-lā-rē'ā), small island between Africa and Sicily, in the Strait of Sicily; area, 58 sq. m.; anciently called Cosyra, was used by Roman emperors as a place of banishment for offenders.

Pan'theism, word first used by Toland at the beginning of the eighteenth century to designate absolute monism; the identification of the totality of being with God. Pantheism is absolute monism, maintaining that the entire phenomenal universe is the ever-changing existence form of the one single universal substance, which is God. Thus God is all, and all is God. God is absolute being, of which every finite thing is a differentiated and transient form. Pantheism in all its forms must either deny the moral personality of God or that of man, or both. Logically, pantheism does render both impossible. God comes to self-consciousness only in man; the consciousness of free personal self-determination in man is a delusion; moral responsibility is a prejudice; the supernatural is impossible, and religion is superstition. Yet such is the flexibility of the system that in one form it puts on a mystical guise, representing God as the all-person absorbing the world into Himself, and in an opposite form it puts on a purely naturalistic guise, representing the world as absorbing God, and the human race in its ever-culminating development as the only object of reverence or devotion. The intense individuality and the material science of the nineteenth century has reacted powerfully upon pantheism, substituting materialism for idealism, retiring God and elevating man, as is seen in the degeneration of pantheism into atheism.

Pan'theon, most perfectly preserved of the structures of ancient Rome; in the Campus Martius (Piazza della Rotonda); now used as a Christian church, St. Maria Rotonda. The building proper consists of a cylinder 142½ ft. in interior diameter, surmounted by a hemispherical dome of the same height above the floor. A statue of Cæsar and six statues of gods originally occupied niches in the interior. The building is lighted by a single opening in the center of the dome nearly 30 ft. in diameter. The architrave of the pronaos or portico has an inscription stating that the building was constructed by Marcus Agrippa, consul, 27 B.C.; another inscription attests that it was restored by Severus and Caracalla, 202 A.D. Excavations have established the fact that the structure, with perhaps the exception of the pronaos, dates from the reign of Hadrian and probably from the years 120–124. It was transformed into a Christian church, 607 A.D.

Panthéon, classical building in Paris, France; known also as the Church of Ste. Geneviève, patron saint of the city; is a Greek cross formed of four aisles uniting under a dome 66 ft. 8½ in. in diameter at the base, and 258 ft. in height from the floor to the top of the lantern; height of edifice, 190 ft. from the ground; length externally, 340 ft.; it was begun 1764; finished 1790; dedicated, 1791, as a Pantheon to perpetuate the memory of illustrious citizens; since frequently used as a church.

Pan'ther, name originally applied to the Old World leopard (*Felis pardus* L.), but in the U. S. used for the puma (*F. concolor*).

Pan'tograph, instrument used in copying maps and other drawings, either on the same or on some other scale; invented, 1603, by Christopher Scheiner; later improved by Prof. Wallace, of Edinburgh. As enlargements and reductions can now be made with more exactness and ease by photography, there is not so much use for the pantograph as formerly.

Pan'tomime, art of representing thought, sentiment, will, and action by mimicry only, by attitude, gesture, and movement; is a Roman invention, and originated in the time of Augustus. Of the old Roman *atellanæ*, a sort of improvised comedy performed at the festivals of the nobles by their own sons and for the sake of amusement only, the mimical imitation of what was awkward and ridiculous and the display of bodily adroitness and skill formed the principal part. The pantomimists borrowed the masks Harlequin, Perrot, Columbine, and Pantalone from the *commedia dell' arte*, formed a loose plot, mostly of comical elements, and filled out the scheme in a manner half acrobatic, half ballet. In all capitals of Europe, and at certain seasons in all the larger towns, there are found theaters which are exclusively devoted to the representation of pantomimes.

Paoli (pow'lē), **Pasquale di,** 1726–1807; Corsican revolutionist; b. near Morosaglia; became leader of party which strove to expel the Genoese from Corsica; defeated their army and fleet, and deprived them of nearly all their strongholds on the island. In 1768 the Genoese sold their claims of Corsica to France; 1769 Paoli was driven from the island by a French army and fled to England, where he received from the government a large pension. After the outbreak of the Revolution in France he was appointed chief of the civil and military administration in Corsica; again placed himself at the head of a revolution; appealed to Great Britain, and proclaimed George III King of Corsica, but was not appointed viceroy, as he had expected; returned to England, and died near London.

Paolo (pä'ō-lō), **Fra.** See SARPI, PAOLO.

Paolo Veronese (vā-rō-nā'zā). See VERONESE, PAUL.

Pa'pacy. See PAPAL STATES; POPE.

Pa'pal States, portion of Italy which, before the unification of the kingdom, was under the temporal government of the Holy See; tended, though with a very irregular shape, from the Adriatic to the Mediterranean; bounded S. by Naples and on the W. and N. by Tuscany, Modena, and the Austrian possessions; comprised an area of about 16,000 sq. m., with 3,124,668 population, and had Rome for the capital. The pope possessed temporal authority over a part of this region from the time of Constantine the Great. Pepin de Bref defeated Aistolf, the King of Lombards, and compelled him to yield up to the pope, Stephen III, the exarchate of Ravenna, comprising, besides the so-called Pentapolis, or the five cities of Rimini, Pesaro, Fano, Sinigaglia, and Ancona, seventeen other cities, mostly on the coast of the Adriatic, and thus the foundation of the Papal States was laid. Pepin's son, Charlemagne, confirmed and enlarged the donation, but in the ninth and tenth centuries much of the papal territory was lost, and in the first half of the eleventh century the temporal jurisdiction of the pope was not recognized beyond Rome and its immediate vicinity. In 1053 the pope obtained the city of Benevento, and, 1114, the Countess Matilda of Tuscany left all her fiefs, consisting of Parma, Modena, Mantua, and Tuscany, to the pope. It was not until 1278 that Pope Nicholas III succeeded in compelling the German Emperor, Rudolf I of Hapsburg, to acknowledge him as a free sovereign, thereby establishing the Papal States as an independent empire.

The papal territory underwent changes during the wars of Napoleon, being at one time entirely incorporated with France, but, 1814, it was restored with nearly its former boundaries. After the Italian war of 1859 the legations voted for annexation to Sardinia, and the troops of Victor Emmanuel entered Umbria and the Marches and defeated the papal forces at Castelfidardo. Rome and the patrimony of St. Peter were all that was left to the pope. The French garrison evacuated the city August 2, 1870, and on September 20th King Victor Emmanuel took possession of Rome, declaring it the capital of Italy, and thereby abolishing the temporal power of the pope, who was nevertheless guaranteed the possession of the

Vatican and Lateran palaces and an annual stipend, never accepted.

Papavera'ceæ. See POPPY.

Papaw', (1) fruit of a small tropical American tree (*Carica papaya*) of the family *Passifloraceæ;* has an acrid quality, and when boiled with meats renders them tender. The juice, at least before the fruit is ripe, contains a remarkable albuminous substance resembling or

PAPAW.

identical with fibrin, is anthelmintic, and has detergent powers. (2) In the U. S. the name papaw, or pawpaw, is given to *Asimina triloba, parviflora, grandiflora,* and *pygmæa,* handsome shrubs, or the first a small tree, of the family *Anonaceæ.* The pulpy fruit of the first mentioned is edible, but is not generally esteemed.

Papayotin (păp-ă-yō'tĭn), substance derived from a plant called *Carica papaya,* the juice of which is capable of transforming proteids into peptones; supposed to differ from pepsin not only in its vegetable origin, but also because it acts in the presence of either an alkali or acid; other derivatives of the juice have been introduced into medicine, the chief of which are papain and papoid.

Pa'per, a substance made in the form of sheets or leaves, in varying thicknesses, and employed for writing or printing upon; also for wrapping purposes, and in the manufacture of various articles of common use or of industrial and scientific application. Vegetable fiber is the base and chief component of the article of commerce known as paper. This is used in various forms and with different intermixtures, animal as well as mineral fibers being at times incorporated into its substance, with loading or filling material and coloring matter. In its pure state vegetable fiber is known as cellulose. It is white, translucent, slightly heavier than water, without taste or odor, and is insoluble in all simple solvents; its chemical formula is $C_6H_{10}O_5$.

The fibers chiefly used in the manufacture of paper are those of cotton, bast (as linen, jute, and hemp), those derived from whole stems or leaves and associated with various vessels and cells not properly fibers (as straw, esparto, sorghum, and bamboo), and lastly those derived from wood. Paper derives its name from an aquatic plant, the papyrus which grew in Egypt. The material obtained from this plant was the first product, so far as known to us (except the wasp's nest), resembling that which we call paper. The manufacture originated with the Egyptians at least two thousand years before the Christian era. The Egyptian reed held undisputed command of the market for hundreds of years; in Europe till the twelfth century attempts were made to supersede it, notably by the use of parchment, but success in this direction was not attained until the introduction of paper made from cotton fiber. The Chinese are credited with the discovery of the art of paper making by the use of fibers reduced to a pulp in water. Their raw materials were the inner bark of the mulberry tree, bamboo, rice straw, rags, etc.

In the making of "hand-made" paper, the pulp, which has been prepared by machines, is mixed in a vat with water to the necessary degree of diluteness, after which the work of the person who makes the sheet of paper begins. This workman has a mold or sieve covered on one side with fine wire cloth and a movable frame, called the deckle, both forming a shallow tray. The vatman takes a mold and lays upon it the deckle; he then dips the mold into the pulp, which is kept uniformly mixed with the water in the vat by means of an agitator, and lifts up as much of the pulp as will form a sheet of paper; to this he gives a shake from him and back again, and then from right to left and back again; this done, he transfers the mold to his assistant. The assistant turns the mold upside down on a piece of woolen felt, and places another piece of felt on the sheet of paper thus deposited. The felts and sheets of paper are alternated until a pile is formed, which is then submitted to great pressure. Then this pressure is taken off, the felts and sheets of paper are drawn out and laid in separate piles. The paper is afterwards put into another press to remove the felt marks and to get rid of more moisture; it is next hung up, sheet by sheet, to dry, after which it is sized with gelatin. The paper is again pressed, dried, sorted, counted, packed, and in this finished condition goes to market.

In the U. S. to-day paper is almost universally made by machinery. If rags form the original material, they are sorted, cleaned, cut into small pieces, and then boiled in steam. After draining, the cooked rags are taken to the engine room, and are there washed by a stream of water through the washing engine until the water runs clear. The washing engine consists of an oblong tub of wood or iron, rounded at the ends. It is made in various sizes, to accommodate from 100 to 1,500 lb. of rags. In the center of the tub there is a partition, the "midfeather," with a passageway at each end for the circulation of the water and rags through the engine. On one side of the "midfeather," occupying the space between it and the wall of the tub, is a cylinder or roll set with a series of steel knives,

and beneath this roll is a bed plate, also furnished with steel knives and set in the floor of the trough, which at this point rises with an inclination to and surrounding the roll at a short distance therefrom, and then drops in an inclined plane known as the "backfall" to the level of the tub bottom. On the other side of the "midfeather" the floor of the tub is flat and level with the ends, and on this side is located the washing apparatus, which consists of one or two cylinders, whose framework is covered with wire gauze. The roll and the washing cylinders are mounted in such a manner as to be raised or lowered at both ends. When the washing is going on the

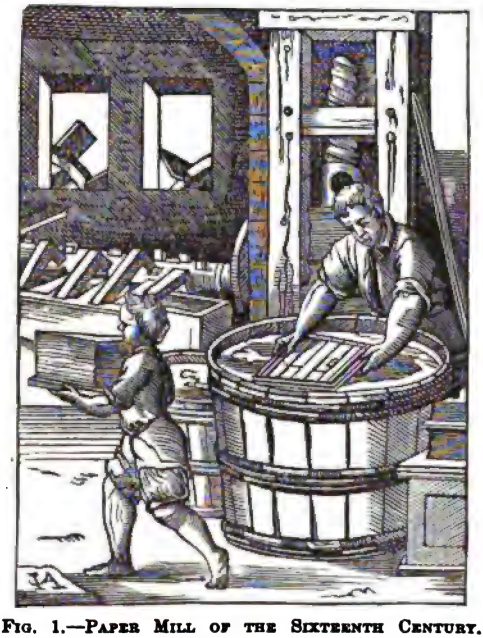


FIG. 1.—PAPER MILL OF THE SIXTEENTH CENTURY.

washing cylinder is partially submerged in the contents of the engine, the water which passes through its gauze covering being discharged through an opening in the journal which rotates it. During the process of washing the stock or material is also treated in such a way by the knives on the engine roll that the fibers are separated and drawn out so as to be long and flexible.

In some mills the stock is bleached in an engine intermediate between the washing engine and the beating engine; in others the bleaching is done in the washing engine. It is effected by adding to the "half stuff" in the engine a solution of bleaching powder (chloride of lime).

The next operation is that of beating, in which process the "half stuff" is reduced to that stage of fineness requisite to convert it into paper. The beating engine is of the same type and form as the washing engine, but it is provided with sharper knives and the roll is set down closer to the bed plate. The cylinder washer is employed for a short time to wash out the bleaching solution. The beating is then continued until the fibers are reduced to the proper length. Next follows the sizing, if engine-sized papers are to be made; also the "loading." The material used for loading or filling purposes not only adds to the weight, but further serves the useful purpose of filling the pores and giving a finer surface to the paper when it is finished. The ordinary filling is china clay, but other substances are also employed. Engine sizing consists in adding to the pulp a resin soap made by boiling powdered resin with soda ash, or crystals of soda, the alkali having been previously dissolved in water. If not thus sized the paper is treated with animal size, as described below, or it may be both engine sized and animal sized. The coloring material is also applied in the beating engine, or in making white papers the pulp is given an addition of ultramarine or other necessary color, mixed in water and strained.

At this stage the pulp is emptied from the beating engine into large cylindrical vats, in which more water is added to the pulp until it is dilute enough to be transferred by means of a stuff pump to a regulating box, the function of which is to provide a regular supply of pulp to the machine; thence the pulp is carried to the screen or strainer. On leaving the strainer the pulp passes into a vat in which there is an agitator to keep it well mixed in suspension with the water. There are numerous modifications of the beating engine, designed with a view to economy of space, the more rapid and even treatment of the material, etc.

From the vat into which the pulp discharges after it has passed the screens or strainers it flows down over an apron to the endless wire cloth of the Fourdrinier machine. This wire cloth is generally from 32 to 40 ft. long, its width being variable and based upon the greatest width of the sheet of paper which it is intended to make. The wire cloth is made of fine brass wire, the meshes varying from sixty threads upward to the inch. The wire cloth is supported on a series of brass rolls of small diameter placed near together. By this means uniformity in the layer of the pulp on the wire is gained, if the stuff in the vat is maintained of even consistency. These "tube rolls" are supported in an iron frame to which a violent lateral motion is given. This causes the fibers to interlace in various directions, and thus form a sheet which shall be nearly, if not quite, as strong in one direction of its texture as another. The water drains from the pulp through the wire cloth, and is received in a shallow box or trough. The frame in addition to the tube rolls carries several other rolls. On top of the frame at the point where the pulp flows on the machine, and extending lengthwise of it for about two thirds of the length of the wire, there is a "deckle frame" supporting two endless rubber straps, each about 1¼ in. thick, and running over pulleys, one on each side of the machine. These rest upon the wire cloth, and, preventing the pulp from spreading or flowing over its edges, regulate the width of the paper. By the time the pulp has passed the deckles the sheet is

formed, although yet in a very moist and weak condition. Next and near to the deckles is located the "dandy roll," a cylindrical framework of brass covered with fine wire cloth, which presses on the surface of the wet layer of pulp, and aids in expressing the moisture; it also impresses what is known as the "watermark" upon the paper. This impression is given by means of designs made from wire and soldered to the exterior covering of the roll. If the paper is not intended to receive any special design, but is to be alike on both sides, no device is fixed to the interior of the dandy roll, and the impressions made by the

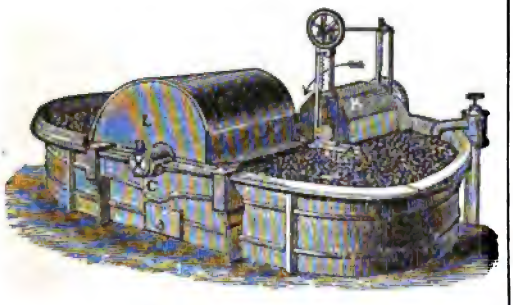


FIG. 2.—BEATING ENGINE.

latter upon the moist pulp are the same as those received from the machine wire on its under surface. In this case the paper produced is known as "wove." "Laid" paper is that which has parallel lines watermarked at equidistant intervals, the marking being done by a series of wires encircling the exterior of the dandy roll. For the purpose of extracting a further amount of moisture from the pulp layer before it leaves the wire, there are two or more suction boxes having open or perforated tops.

At this stage the paper has acquired sufficient consistency to pass without breaking to the couch rolls, two in number, the lower one carrying the wire cloth and giving it motion. From the couch rolls the web is conveyed on an endless woolen felt between the two "first-press rolls." The paper is then carried to the "second press," where it is transferred to another endless felt, which in turn conveys it farther on its way to the "dryers." The "dryers" are metal cylinders of large diameter heated by steam. These drying cylinders vary in number on different machines, and are ranged one after the other, or in two tiers, one row above the other. Having passed the dryers, the web is passed between a series of polished rolls, or "calenders," mounted one above the other in a frame, to form a "stack," their purpose being to give the paper a smooth surface. Leaving the calenders, the web is wound on reels, and thence it goes to the cutter, where it is divided into sheets. Where the paper is intended for use on a web printing press, it is always supplied in rolls. Should it be desired to give the paper a higher finish than it has so far received, it is taken to the finishing room, where it is subjected to the action of supercalenders having rolls made from disks of paper or cotton batting, mounted on steel shafts, and so solidly compressed by hydraulic pressure that they can be turned off truly cylindrical in a lathe. These rolls alternate with chilled-iron rolls in a frame. Another method of surfacing is to pass the sheets of paper between highly polished metal plates, through two heavy rolls which give a powerful pressure. So treated the paper is said to be "plated."

The method of sizing in the engine has been outlined. The sizing is done for the purpose of removing the porous and absorbent character of the paper, so that it can be written on. Further sizing is given on the machine, a weak solution of gelatin or animal size being placed in a shallow box through which the paper passes midway of the dryers, going thence between two "squeeze rolls," which remove the superfluous size; this is known as "tub sizing" as well as "machine sizing."

The Cylinder Machine.—An English paper maker named Dickinson is credited with the invention of the cylinder paper-making machine in 1809. This machine is of an entirely different type from the Fourdrinier. It consists of a large and square vat, in which is mounted a framework of brass covered with coarse wire cloth, over which an outer covering of fine wire is smoothly fitted. This cylinder is of large diameter, and fits closely by means of interposed packing to the sides of the vat in which it rotates. As the cylinder rotates it takes up on its surface a thin film of pulp, which, as it encounters atmospheric pressure, is drained of some of its water through the wire covering of the mold, the water passing out through the end of the cylinder and through the side of the vat. At the top of the vat, and connected therewith, is a framework carrying a couch roll, which rests upon the face of the making cylinder, and rotates with the latter. An endless felt runs over the surface of the couch roll, and passes to and between the first press rolls, which are located in a stand next to the vat. As the thin film of pulp forms on the cylinder mold it is brought up and in contact with the felt passing over the couch roll, and, being taken up by the felt, is carried continuously onward to the first press, where it loses a further proportion of moisture, thence to the second press, as on the Fourdrinier machine, and then to the dryers and calenders. There is less waste of pulp on the cylinder machine, but as there is no "shake" to give lateral motion to the fibers, the latter lie mostly in the line of travel of the web, the paper thus made being weaker across the grain than lengthwise. A double- or triple-cylinder machine consists in the combination of two or three vats and making cylinders, such a combination sometimes including twelve vats and cylinders. In such machines as many webs of paper as there are cylinder molds are formed and brought in contact prior to going through the press rolls, where they are pressed together. Thus it is possible to make sheets of varying degrees of thickness. The inner layers may be made of cheaper stock, while

the exterior surfaces may be of a better grade of material and colored as fancy may direct.

Wet Machine.—This is the first part of a single-cylinder machine, having first-press rolls, and is arranged to wind the sheet of paper in continuous layers upon the upper press roll until the desired thickness of material has accumulated upon the roll. When this has been attained an alarm bell rings, and the attendant then operates a hand lever which moves a knife down and on to the roll, by this means cutting open the paper cylinder formed on the roll and releasing the sheet. The wet machine is used for making binders'

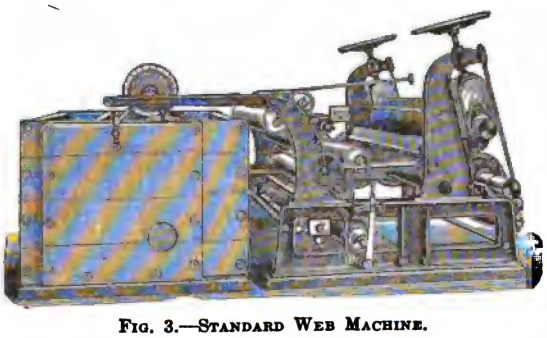


FIG. 3.—STANDARD WEB MACHINE.

board, wood-pulp board, leather board, etc., and sometimes for strawboard.

Esparto grass, otherwise known as alfa and Spanish grass, is used to a great extent in Europe. The fiber after bleaching is white, soft, and of excellent quality. A similar boiling process is employed for the production of pulp from ordinary straw. The alkali in the residuum is recovered by evaporation, in special apparatus, to the extent of about eighty per cent. One of the most important paper-making materials is derived from wood. There is a distinction between wood pulp and wood fiber. The first is obtained by mechanical means and the second by chemical treatment. Wood pulp is produced by grinding. Wood pulp has been the great cheapening agent in what are known as print papers. While paper can be made entirely from wood pulp, or mechanical pulp, as it is sometimes called, the fiber is too weak to make a sheet of paper of sufficient strength for most of the ordinary purposes of daily use, and for this reason it is mixed in varying proportions with other material, wood (chemical) fiber being the chief admixture. Wood fiber is commonly known as chemical fiber. It is produced by two methods—the alkali and the acid processes. In the alkali or soda process the encrustating matter of wood is easily operated upon by dilute alkali, the power of which is increased at a higher and increasing temperature. The alkali has a solvent and saponifying effect. Poplar is the wood generally employed in the soda process, although other woods can be and are utilized, including pine, spruce, and hemlock. The wood is denuded of its bark and cut into chips, which, after being dusted, are put into large boilers commonly known as digesters, which are heated by coils supplied with steam through the journals and rotating with the boiler. The chipped wood having been packed in the digester, a solution of caustic soda is added to it. A steam pressure of about 90 to 100 lb. from eight to ten hours is requisite to cook the wood. The resultant fiber, when washed and bleached, is almost entirely pure cellulose, soft and of a fair degree of strength. The sulphate process is a modification of the soda process. In this the carbonate of soda is substituted to a large degree by the sulphate of soda.

The acid or bisulphite process consists in boiling the previously prepared wood in a solution of bisulphite of lime. Other bisulphites, such as bisulphite of magnesium or sodium, may be used, notably the former, which is employed in the Ekman process. The wood is first prepared with great care, the bark and knots being removed, and also all decayed and stained pieces; it is then cut into chips or into disks about 1¼ in. thick, after which it is packed in the digester. The sulphite liquor is then run in quickly, the digester is closed, and steam pressure is gradually turned on. The strength of the liquor is generally about 10° temperature, carrying about 3½ per cent of sulphurous acid. The corrosive action of the bisulphite liquor is such that it is necessary to line the digesters with acid-resisting coatings. The woods chiefly utilized are spruce and Swedish fir and pine.

Paper is classified under various heads in different countries, and its subdivisions are known by varying names. Its chief divisions are printings, writings, wrappings, and boards. These include nearly all of the grades. Each class has numerous subdivisions.

Although sheets of paper vary in size, when folded to make up in book form they have other designations, according to the number of leaves into which a sheet is subdivided. Thus a sheet of paper when folded is described as follows:

NAME	FOLDED			
Folio,	once	= 2	leaves,	folio.
Quarto,	twice	= 4	"	4to.
Octavo,	four times	= 8	"	8vo.
Duodecimo.	six "	= 12	"	12mo.
Sextodecimo,	eight "	= 16	"	16mo.
Octodecimo,	nine "	= 18	"	18mo.
Quartovigesimo,	twelve "	= 24	"	24mo.
Secundotrigesimo,	sixteen "	= 32	"	32mo.

There are several kinds which call for special description. Some of these are used in the form in which they come from the mill, while others are subjected to treatment in various ways at the hands of manufacturers, broadly known as converters, who prepare the product for special uses. Blotting paper is unsized and used for absorbing ink and fluids. Cigarette paper is a thin tissue from which all chemicals have been removed or neutralized, used with tobacco for making cigarettes. Coated paper is a print paper to which a coating of white material, sometimes china clay, or gypsum, sulphate of barytes, etc., is applied; chiefly used for books or for fine prints from woodcuts and process blocks. Copying

paper is a thin tissue made specially for taking copies of letters, bills of lading, etc. Detail paper is a special grade of heavy Manila paper for the use of artists and draftsmen, its surface being such as to submit to erasures without destroying the texture of the paper. Enameled paper is a glazed paper to the surface of which a metallic pigment has been applied and polished. Filter paper is unsized, thick, and spongy; employed for filtering solutions in pharmaceutical or laboratory practice. India paper is used for taking those impressions from fine engravings on steel or copper known as India proofs; also for proofs of the finest woodcuts and photo-mechanical plates; is made from the inner fiber of the bamboo. Oxford India paper is the thinnest of opaque papers, so thin indeed that five original octavo volumes of the Bible, containing 2,688 pages, have been printed on it and included in the space of one volume. Ivory paper is bristol board coated with animal size, with an admixture of white pigment, and then polished. Japan paper, prized by artists, etchers, and plate printers, is made from the fiber of the paper mulberry in various thicknesses; is of strong texture and creamy color.

U. S. fiber paper is a specialty adopted by the U. S. Govt. for use in its treasury notes and other certificates of indebtedness; is a bank-note paper containing fibers of colored silk, which are added to the pulp as it is made into paper. Manifold paper is a thin tissue used for writing on with a stylus, which produces a number of copies on as many sheets between which strips of carbon paper are interposed. Parchment paper is made by passing unsized paper through a bath of dilute sulphuric acid. Safety paper is chemically or mechanically prepared so that tampering with any printing or writing on it may be detected. Watermarks of a special design are sometimes employed, as in the Bank of England notes, or silk threads are embodied in the fiber, as in U. S. fiber paper. Silver tissue is a fine thin paper used for wrapping silverware. Sponge paper is made from paper pulp containing pieces of sponge in a state of fine subdivision; used in surgery. Toned paper or tinted paper is tinted or has its whiteness subdued or modified by a very slight addition of color to the pulp. Tracing paper is thin paper which has been treated with oil or a thin solution of resin to make it transparent; used by artists and draftsmen. Carbon paper is a thin tissue, saturated with a pigment carried in oil, and capable of imparting color to sheets of paper with which it may be brought in contact. Lithographic transfer paper is prepared by coating paper with starch paste, and is used for transferring designs from one lithographic stone to another. Photographic paper is coated or impregnated with various chemical constituents sensitive to light; occurs under many different names.

Paper Hang'ings, or Wall Paper, ornamental papers intended to be pasted on the walls or ceilings of apartments. Paper hangings are reported to have been made in Spain and Holland before 1555, but their manufacture has only in recent times become a leading industry. The choicest wall papers are of good material, but for the low grade woolen, hempen, and jute waste are used. The paper was formerly all printed by hand, either by the process of block printing or stencil. Cylinder printing is now used, identical in principle with the processes employed in calico printing; but choice styles are still hand printed, the blocks being either engraved wholly in wood or partly made up with metal for the thinner lines. Flock printing is done by printing the pattern in with varnish and then sprinkling on colored flocks, in powder, the flocks being the shearings of woolen cloth. Such papers are generally called velvet paper. Satin papers are finished with powdered statite and polished.

Paper Nau'tilus. See ARGONAUT.

Paphlago'nia, in ancient times a district of Asia Minor, extending along the S. shore of the Euxine from Pontus to Bithynia, and bounded S. by Galatia; inhabited by wild and warlike tribes belonging to the Semitic race; celebrated for the excellent horses it produced; originally formed an independent state, but was conquered by Crœsus, and later merged in the Persian Empire. After the death of Alexander it became independent once more, but was conquered by Mithridates, and after his fall it was made a part of the Roman province of Galatia.

Pa'phos, name of two ancient cities of Cyprus; one, the present Kukla, was often called *Palaipaphos* (Old Paphos), and was famous for its Temple of Aphrodite, who was said to have been born here from the foam of the waves; the other, the present Baffa, was called *Neopaphos* (New Paphos), and was the place where St. Paul preached to Sergius.

Papier-maché (pā-pyā' mā-shā'), pulp of paper mixed with glue or gum arabic, molded, and dried, or paper pasted in sheets on models. The cheaper articles of papier-maché are made of white or brown paper mashed in water and pressed in oiled molds. The better articles are produced by pasting or gluing together sheets of paper, which, when a proper thickness is attained, are powerfully pressed and dried. While moist the preparation may be molded into any form, and when dry it may be planed and rasped to shape. Several coats of varnish are next applied, and the inequalities are rubbed down with pumice stone. It is ornamented with gold, bronze powder, or colors, after which a varnish of shellac is applied and dried.

Papin (pä-păn'), **Denis,** 1647–1712; French physicist; b. Blois; practiced for some time as a physician, but devoted himself later to physics and mathematics under Huyghens; made, 1687, Prof. of Mathematics at Marburg; writings are numerous, but scattered; contain many valuable discoveries, most of which, however, were not fully recognized during his lifetime; was the inventor of Papin's digester, a contrivance for softening bones; 1707 tried on the Fulda River a vessel propelled by paddles operated by a steam engine; improved the pneumatic machine invented by Otto von Gue-

ricke; and was active in the controversy with Leibnitz concerning the so-called "dead" and "living" forces.

Pa'pua. See NEW GUINEA.

Papy'rus, large reed, various parts of which were employed by the Egyptians in the construction of boats, mats, baskets, and other woven fabrics, but particularly in the preparation of writing paper. It is known as *Cyperus papyrus* (*Papyrus antiquorum*), and is extinct in Egypt, being found only in remote parts of Abyssinia; is also said to occur in W. Asia. In the hieroglyphic writing the papyrus plant

PAPYRUS.

is employed as the symbol of Lower Egypt. The stalks were triangular, from 4 to 6 in. in diameter and 12 to 15 ft. high. The roots were used for fuel, and a part of the inside of the stalk was edible. For paper making a piece of the stalk of a length corresponding to the width of paper required was cut off, the rind was removed, and the inner portion was unrolled with a needle or a sharp knife. On this sheet another was placed transversely, and the two were joined by the juice of the plant or by a thin gum, the union being enforced by heavy pressure. The sheets were smoothed and afterwards bleached by exposure to the sun. The color varied from a gray or yellow to a rich brown. The sheets varied from 6 to 17 in. in width, and any required length was obtained by fastening a number of sheets together end to end. The *Papyrus harris* in the British Museum is the longest known, being 135 ft., and a fairly full copy of the ritual of the dead required a roll 15 in. wide and from 80 to 90 ft. long.

Pará (pä-rä'), officially, **BELEM**, capital of State of Pará, Brazil; at the mouth of the river Guamá in the Pará; 85 m. from the mouth of the latter in the Atlantic; is regularly laid out with wide streets, which, except in the business portion, are adorned with mangrove and other trees; principal public buildings are the cathedral, customhouse (formerly a Jesuit convent), and the government theater; the president's and bishop's palaces and the house of the legislature are plain buildings. The finest residences are in the quarter called Nazaré; many of them are surrounded by extensive gardens. Pará has a marine arsenal, botanical garden, museum, library, theological seminary, and good public and private schools; is the commercial metropolis of the Amazon valley; exports rubber far in excess of any other port in the world, averaging (including that in transit) over 8,000,000 lb. annually. Pop. (1900) 100,000.

Par'able, short fictitious narrative intended to illustrate some point in moral or religious teaching. Parables abound alike in the teaching of Christ and in the Jewish Talmudical writings; but the parables of Christ (not used by Him in the beginning of His ministry, but only after He had encountered opposition) immensely surpass all others. See ALLEGORY; FABLE.

Parab'ola, a plane curve on one of the conic sections, formed by intersecting a cone, having a circular base, with a plane parallel to one of its sides. In modern geometry it is defined as a curve of the second degree, touching the line at infinity. Every part of the curve is equally distant from a fixed point, called the *focus*, and from a given straight line, called the *directrix*. A straight line through the focus perpendicular to the directrix is the *principal axis*. At every point of the curve the line from the focus and a parallel to the axis make equal angles with the tangent. Any line parallel to the principal axis is called a *diameter*, and every diameter bisects all the chords of the curve that are parallel to the tangent at the point where it meets the curve. The principal axis is therefore a line of *right* symmetry, and every other diameter is a line of *oblique* symmetry. The breadth of the curve through the focus is called the *parameter* of the curve or the parameter of the principal axis. The parameter of any diameter, including the parameter of the principal axis, is equal to four times the distance from the focus to the vertex of that diameter.

Parab'oloid, surface of the second order whose plane sections parallel to a certain right line are parabolas. In modern geometry it is defined as a surface of the second degree, touching the plane at infinity. There are two principal kinds, the elliptic and the hyperbolic. In both paraboloids all sections parallel to the straight line called the axis are parabolas, while in the elliptic paraboloid all other sections are ellipses.

Paracel'sus (assumed name of PHILIPPUS AUREOLUS THEOPHRASTUS BOMBASTUS VON

HOHENHEIM), 1493–1541; Swiss alchemist; b. Einsiedeln; son of a physician, from whom he learned something of medicine, alchemy, and astrology; made himself proficient in conjuring and juggling; traveled on foot through Europe, collecting information on the healing art; and was made Prof. of Physic and Surgery in the Univ. of Basel. He proclaimed himself sole monarch of physic, publicly burned the works of Galen and Avicenna, and professed to know the art of prolonging life and curing all diseases. He was compelled to leave Basel, and, after wandering through Germany, died in poverty in Salzburg.

Parachute (păr'ă-shūt), machine first successfully employed by Blanchard at Strassburg, 1787, designed to enable aëronauts to descend safely from a balloon. It is shaped like an umbrella, and is taken up in a collapsed or closed form. The car is attached beneath the parachute, and the balloon above the whole; a rope passing through the hollow stem of the parachute attaches the balloon to the car; this rope is cut at the proper time, the car falls rapidly, and the parachute is expanded by the action of the air. The car's downward motion is thus checked, and it descends slowly toward the earth. In practice, the parachute is not to be depended on.

Par'adise, literally, a garden or pleasure ground planted with trees and flowers. In the Septuagint it is employed to express the Hebrew "garden of Eden." Metaphorically the word expresses the happiness of the righteous in a future state, an application adopted by the later Jews.

Paradise, Bird of. See BIRD OF PARADISE.

Paraffin (păr'ăf-fĭn), white, waxy solid which occurs native in the mineral wax ozokerite, found in Galicia, Utah, and elsewhere and in some kinds of petroleum, and also found in coal and shale oil, and the products of the destructive distillation of many other organic bodies, as oil, fats, wax, wood, peat, etc. It was discovered by Reichenbach, 1830, in wood tar. Paraffin is obtained from ozokerite by distillation, cooling, and pressing the product, and purifying it by treatment with sulphuric acid and caustic soda, washing and pressing. By similar means it is prepared from the heavier portions of coal oil and petroleum, which solidify on cooling. Besides candles, paraffin is used for waterproofing fabrics, cloth, and leather for shoes, even dress silks, which are thus protected from stains. It is used for protecting from rust or decay, and putrefaction, meat, fruit, timber, metals, cartridges, pills, etc.; for making tight the stoppers of acid bottles; as a substitute for sulphur in matches; for oil baths of constant temperature; for refining alcohol and spirits, by passing the vapor during distillation through melted paraffin, which abstracts the fusel oil; a great deal used for chewing gum.

Paraguay (pă-rā-gwī'), smallest of the S. American republics, except Uruguay; between Bolivia on the N., Brazil on the N. and E., and the Argentine Republic on the SE., S., and W.; area, 98,000 sq. m.; pop. (1905) 631,347. The Paraguay River divides the country into two sections. W. of the Paraguay is a low plain, a wilderness of swamps, forest, and grass lands. The larger portion (about 62,000 sq. m.) occupies a peninsula formed by the Paraguay and upper Paraná rivers, which unite at the SW. extremity; the N. boundary is the Apa River, and the NE. is formed by the continuation of a line of heights which begins about 75 m. ESE. of Asuncion and extends NNE. across the country. The maximum elevation is probably less than 2,500 ft. The Paraguay and Paraná rivers are natural highways of importance. The Jejuy and Tibicuary, affluents of the Paraguay, are both navigable.

Iron, gold, copper, pyrites, marble, and kaolin are found. The climate is tropical, but the temperature varies, according to the prevalence of S. or NE. winds. The mean for the year is about 73° F.; in December and January the thermometer occasionally rises about 100° at Asuncion, and from May to August light frosts are sometimes felt when the S. wind blows. Important industries are agriculture, grazing, maté gathering, and timber cutting. The common crops are mandioca, maize, beans, sugar cane, oranges, and tobacco. Ocean steamers ascend to Asuncion and beyond, and there is telegraphic communication with Europe. Exports, generally about $26,000,000 in value annually, are mainly to the Argentine Republic; principal items, maté, tobacco and cigars, timber, hides, jerked beef, quebracho extract (for use in tanning), and oranges.

The president is elected for four years, as well as the congress, consisting of two houses; recognized religion, the Roman Catholic, but all sects are tolerated; education, nominally compulsory. Sebastian Cabot explored the Lower Paraguay, 1527. After Pedro de Mendoza founded the first colony of Buenos Aires he sent an expedition up the Paraguay under Ayolas, who, about September, 1536, founded Ascunsion, which later became the capital of the region; this was soon after attached to the viceroyalty of Peru. In 1620 Buenos Aires was separated from Paraguay, both remaining provinces of Peru till 1776, when Paraguay was attached to the new viceroyalty of Buenos Aires, or La Plata. Paraguay declared its independence, 1811; but fell almost immediately under the dictatorship of Francis; succeeded by Carlos Antonio Lopez, 1841, and, 1862, by his son, Francisco Solano Lopez. All these dictators or presidents continued a policy of isolation. The ambition of the younger Lopez plunged it into a war with Brazil, the Argentine Republic, and Uruguay, 1864–70. It ended with the death of Lopez, but left the whole country ruined and its population reduced to little over one third. Misiones, part of the Chaco, and a considerable territory on the N. were given up to Argentina and Brazil. The present constitution was adopted soon after the war, and since then the republic has enjoyed internal and external peace. A boundary dispute with the Argentine Republic, involving part of the Chaco, was referred to the arbitration of the President of the U. S., and, 1878, was decided in favor of Paraguay.

Paraguay Riv'er, river of S. America; rises near the center of the continent, on the Brazilian plateau of Matto Grosso; flows S. through Brazil, between Brazil and Bolivia, through Paraguay and between Paraguay and the Argentine Republic, and finally joins the Upper Paraná to form the Lower Paraná near lat. 27° 13′ S. The Paraguay rises in a group of little ponds, the Sete Lagôas, on a low part the plateau, 1,000 ft. above the sea. Swelled by numerous affluents it is already a large stream at Villa Maria; 30 m. below and only 400 ft. above the sea it enters the great depression of the Paraguay and Paraná. The longest affluents are the Pilcomayo and Bermejo, which join it from the W. in the Chaco region; nearly all the other branches are on the E. side. The most important navigable ones are the São Lourenço (with its branch, the Cuyabá), the Jaquary, and Miranda in Brazil, and the Jejuy and Tebicuary in Paraguay. The main river is open to free navigation; is the only commercial outlet of Paraguay and Matto Grosso; estimated length, 1,800 m.; discovered by Cabot, 1526; explored nearly to its source by Irala and others before 1550.

Parahyba (pä-rä-ē'bä), capital and largest town of Brazilian state of same name; on the Parahyba do Norte; 11 m. above its mouth; is one of the oldest towns in Brazil, dating from 1579; among ancient buildings are the cathedral and the college of the Jesuits; modern government buildings are unpretentious. Only light-draft vessels can ascend to this point, larger ones anchor at Cabadello, near the mouth of the river, a thriving little town, rapidly superseding Parahyba as a commercial center. Pop. (1906) 32,000.

Parahyba, or Parahyba do Sul (dō sōl), river of SE. Brazil; rises in São Paulo, flows E. between Minas Geraes and Rio de Janeiro, nearly parallel to the coast, and enters the Atlantic near lat. 21° 38′ S.; length (with its principal head, the Parahytinga), 658 m. The valley of the Parahyba, which separates the Serra do Mar from the Serra da Mantiquiera, is populous, and is one of the richest coffee regions in Brazil.

Paral'dehyde, clear, colorless liquid, having a peculiar ethereal odor and a warm followed by a cold taste; prepared by treating ordinary aldehyde at a moderate temperature with small quantities of hydrochloric acid, and purified by repeated freezing and rectifying; employed in medicine as a hypnotic.

Par'allax, apparent displacement of a heavenly body arising from a change of the observer's position. The angle subtended at the body by the line joining the two stations is the measure of the parallax. As the positions of the heavenly bodies have reference in practical astronomy to the earth's center, a correction for parallax is necessary in every observation, except when the body is in the zenith, where the parallax vanishes. It is greatest in the horizon, and is there termed horizontal parallax. It is manifestly equal to the angle subtended by the earth's radius as supposed to be seen from the body, as the earth's radius varies with the latitude, and the equatorial radius is commonly selected as the measure of parallax.

Parallel'ogram, quadrilateral whose opposite sides, taken two and two, are parallel. If one angle of a parallelogram is a right angle, all the other angles are right angles, and the figure is a rectangle. If two adjacent sides are equal, the other sides are also equal, and the figure is a rhombus. If the diagonals of a parallelogram are equal, the figure is a rectangle; if they are perpendicular to each other, the figure is a rhombus; if they are equal and perpendicular, the figure is a square. The area of a parallelogram is equal to the product of its base and altitude.

Parallelopi'ped, polyhedron bounded by six parallelograms. If the faces are rectangles, the volume is a rectangular parallelopiped; if the faces are squares, the volume is a cube. The volume of any parallelopiped is equal to the product of its altitude and the area of its base.

Par'allels of Lat'itude, on the terrestrial sphere, circles drawn around the earth on planes parallel to the equator. Through the center of each circle passes the earth's axis. The equator itself is the only one of these parallels which is a great circle. The others are smaller circles, whose limits are the great circle (the equator) on the one hand, and zero (at the poles) on the other.

Paral'ysis, loss of voluntary or reflex motion, generally through failure of nervous excitation. A partial loss of motion is termed paresis. From the motor centers of the brain nerve fibers travel downward to the spinal column. In the latter are secondary centers which produce motion only after receiving impulses from the brain. From the secondary spinal cells originate the nerves of the body, which carry the impulse to the muscles. Paralysis may be due to disease or destructive change anywhere along this tract. If the disease is in the brain, we speak of cerebral paralysis, as in apoplexies; if in the spinal cord, of spinal paralysis, as in palsy of infants; if in the nerves, of peripheral palsy, as in paralysis from pressure of a crutch on the recurrent spiral nerve of the arm. Any part of the body containing muscle fibers may be paralyzed. It is customary to divide cases of paralysis into groups according to the parts affected. Hemiplegia designates paralysis of one lateral half of the body. It is generally due to a cerebral lesion, and nearly always follows after cerebral hemorrhage or apoplexy. Sometimes the face is paralyzed on one side, while the arm and leg of the opposite side are affected. This "crossed palsy" is due to disease in the *pons Varolii*. Paraplegia is paralysis of the lower half of the body, affecting both legs and perhaps part of the trunk. It is due to disease of the spinal cord, or more rarely of the nerves of the legs. Monoplegia is the paralysis of a single member, as one arm or leg. It is due to disease of the periph-

eral nerves, or to affection of the motor center of the brain.

Multiple paralysis is the term by which are designated groups of palsies of irregular distribution. Glossoplegia (paralysis of the tongue), cycloplegia (paralysis of the pupil), laryngeal palsy, etc., are instances of local paralysis, in which only a certain muscle or group of muscles is affected. Of paralysis of the muscles of the face there are two forms: (1) Central, in which the disease is situated between the nucleus of origin of the nerve and the cortex of the brain; (2) peripheral, called Bell's palsy, in which the lesion is in the nucleus or the nerve itself. In the first the upper face muscles are but little or not at all affected, and those around the mouth suffer most, but respond normally to electric stimulus. In the second form there is complete palsy of one side of the face. The onset is rapid, but not sudden. The commonest cause is inflammation of the nerve due to cold.

Paralysis Ag'itans, or Shak'ing Pal'sy, incurable disease of advanced age, characterized by weakness, tremor, and rigidity of the muscles. Men are more often affected than women, and worries and mental strain are important causes. Sometimes the shaking of fear has been followed directly by this disease. There is a fine and continuous tremor of the hands, feet, and less commonly of the head, which, however, ceases during sleep. The muscles are apt to be rigid, and a peculiar mask-like immobility of the facial expression is a marked characteristic. The weakness of the muscles is rarely marked, but is a constant symptom. There is a peculiar staggering gait in which the patient seems to be running after his center of gravity.

Paramar'ibo, capital of Dutch Guiana; on the Surinam, 19 m. above its mouth; has wide streets, shaded with orange and tamarind trees, and gardens around most of the houses; nearly all buildings are of wood; there are many Protestant and Roman Catholic churches, hospitals, barracks, etc.; principal export, sugar. Paramaribo dates from the end of the sixteenth century; was twice bombarded by the French, and has repeatedly been almost destroyed by fire. Pop. (1907) 34,870.

Paramat'ta. See PARRAMATTA.

Param'eter, in mathematics, a term generally expressing a quantity, by whose variation systems of equations or curves, etc., are represented. Thus if the shape and magnitude of a curve be considered, but not its position, the radius is the sole parameter of a circle, and the major and minor axes of an ellipse are its two parameters.

Paraná (pä-rä-nä'), capital and largest town of Entre Rios, Argentine Republic; on a bluff overlooking the Paraná, nearly opposite the mouth of the Salado; center of a rich grazing region; in vicinity are thriving colonies of Germans, Swiss, and Italians; steamers ascending the river touch regularly at this port; founded, 1730; capital of the Argentine Republic, 1852–61. Pop. (1907) 27,000.

Paraná Riv'er, river of S. America; formed in Brazil by the union of the Paranahyba and Grande, both from the mountains of Minas Geraes; flows SSW. to lat. 24° 4', where it forms the magnificent cataract of Guayrá or Salto Grande, and thence S. and afterwards W., dividing Paraguay on the one hand from Brazil and the Argentine Republic on the other, till it is joined by the Paraguay at Tres Bocas, a little above Corrientes, 900 m. above its mouth. Thence it flows S. and afterwards SE. through the Argentine Republic till it unites with the Uruguay to form the Rio de la Plata, after a course of 1,860 m., exclusive of that of the Paranahyba and Grande. The Paraná is full of islands, which, composed of mud and sand bound together by vegetation, undergo a constant round of decay and renovation.

Paranaph'thalene. See ANTHRACENE.

Pará (pä-rä') Riv'er, large inlet in the coast of Brazil, State of Pará, SE. of Island of Marajó, generally regarded as the S. mouth of the Amazon; physically, the estuary of the river Tocantins, but through a network of channels S. and W. of Marajó receives a volume of Amazonian water exceeding that of the Tocantins itself. The Pará, up to the junction of the Amazonian channels, is 120 m. long, 10 m. wide above, and over 30 m. at the mouth.

Par'asang, ancient Persian measure of distance; still in use; variously estimated, but fixed by modern travelers at 3¼–4 m.

Parasit'ic An'imals. See ENTOZOA; EPIZOA.

Parasitic Plants. See EPIPHYTE.

Parcæ (pär'sē), See FATES, THE

Parcel Post. See POSTAL SERVICE.

Parch'ment, skins of sheep and other animals, prepared for being written on. The making of parchment is said to have been improved by Eumenes II, King of Pergamus (197–159 B.C.), whence its name. According to Herodotus, the ancient Ionians wrote on skins many ages before that time, and it is certain that its use was common in Egypt ages before the time of Eumenes. The finer sorts of parchment, called vellum, are made from the skins of calves, kids, and stillborn lambs. The heavier parchment for drum heads is made from the skins of asses, older calves, wolves, and goats. Paper or vegetable parchment, first noticed, 1847, by Poumarède and Figuier, who called it papyrine, and first manufactured, 1857, is used for legal documents and maps, for connecting laboratory apparatus, etc. It is made by dipping unsized paper for a few seconds in a mixture of equal volumes of strong sulphuric acid and water.

Par'do, Manuel, 1834–78; Peruvian statesman; b. Lima; became a banker in Lima, besides conducting several large plantations; President of Peru, 1872–76; was the first civilian ever elected to this office, and one of the best and most popular presidents Peru ever had; was later president of the senate; assassinated.

Par'don, act of grace, which proceeding from the power intrusted with the execution of the laws, exempts the individual on whom it is bestowed from the punishment which the law inflicts for a crime which he has committed. In the forms of government which have most prevailed pardon has always been the prerogative of the sovereign. In democratic states, the people have generally delegated the power of pardon to the chief executive magistrate. In the U. S. the pardoning power is generally vested in the executive. The Federal Constitution authorizes the President "to grant reprieves and pardons for offenses against the U. S., except in cases of impeachment." It is to be noticed that "offenses against the U. S." can be pardoned only by the President. Offenses against the several states are pardonable by the injured state alone. An absolute pardon releases the offender from all disabilities imposed by public law, and restores him to all his civil rights, in the absence of a statute to the contrary. It gives him a new credit and capacity. It does not make amends for the past, nor afford relief for what has been suffered by imprisonment, forced labor, or otherwise. It restores a convicted criminal's competency as a witness, even though it recites that it was granted because his testimony was desired by the Government; but the conviction may be used to affect his credit. If the pardon is granted on a condition precedent, the condition must be performed before the pardon takes effect. If the condition is subsequent, its breach operates to annul the pardon.

Paré (pä-rā'), **Ambroise,** 1517-90; French surgeon; b. near Laval; became surgeon to the French army in Italy, 1536; later provost of the Paris College of Surgery, and surgeon to several successive kings. His fame mainly rests on three important improvements; the treatment of gunshot wounds by simple dressings; the application of the ligature to blood vessels after amputation; and the rule that in searching for a bullet the posture of the patient should be the same as at the moment of receiving the wound.

Paregor'ic, anodyne compound (*Tinctura opii camphorata*), made by taking 4 gr. of powdered opium, benzoic acid, and camphor, and adding 4 c.c. of oil of anise, 40 c.c. of glycerin, and enough diluted alcohol to make 1,000 c.c. The preparation is completed by shaking, maceration, and filtration.

Pareira Brava (pä-rā'rä brä'vä), dried woody root of some S. American climbing plants of the family *Menispermaceæ*; is a tonic and diuretic drug, used especially in chronic inflammations of the bladder, etc.

Par'ent and Child, Rela'tions of, in the U. S., those mutual rights and duties established by the English common law, and modified by statutes. The law secures to the parent the right to the custody and discipline of his minor children. This right is subject to the state's supervision. If a father is guilty of ill treatment or cruelty, or if he habitually indulges in drunkenness, or blasphemy, or gross debauchery, or if his domestic associations tend to corrupt his children, or his acts are otherwise seriously injurious to their morals or interests, a court of equity will take the children and appoint a guardian to care for them. However, courts will interfere between parents and children with great caution, and only where the parent's wrongdoing and the child's danger are clearly established. In many of the U. S. societies for the prevention of cruelty to children have been incorporated, with authority to institute proceedings on behalf of minors whose parents, guardians, or custodians treat them unlawfully. The parent has a legal right to the services of his minor children while within his custody, and to any wages which they may earn. An unlawful injury to the child, which invades any parental right, will subject the wrongdoers to an action by the parent as well as to one by the child. Parental duties are maintenance, protection, and education, though to what extent the common law obliges parents to perform them is a matter of diverse opinion.

Where a child possesses an estate in his own right, a court of equity will authorize the father, in a proper case, and the mother in almost every case, to use the income, or even the principal of such estate for the infant's suitable maintenance and education. A parent's duty to support his children does not survive him, but he is free, in the absence of a statute on the subject, to disinherit them. A husband does not assume the legal relation of parent to his wife's children by a former marriage. While they remain in his family he has the right to control them, and the law presumes, in the absence of any contract on the subject, that he supports them and they render services to him without charge. Under modern legislation, though not at common law, the legal relation of parent and child may be instituted by adoption. While the adopted person becomes the legal child of the adopter, he retains the right of inheriting from his natural parents, unless the statute expressly deprives him of such rights. At common law the child was not legally bound to maintain his parents, but modern legislation has subjected him to an enforceable duty in this respect.

Par'esis, or Gen'eral Paral'ysis, a gradual progressive disease of the brain and nervous system. There are sensory disorders and mental symptoms, at first of exaltation of feeling or expansive delirium, but invariably tending to complete dementia. There are organic changes in the encephalon and its membranes, and sometimes in the spinal cord and its membranes and in some sympathetic ganglia.

Paria (pä'rē-ä), **Gulf of,** small inland sea, 105 m. long from E. to W.; 40 m. wide, between the lowlands at the mouth of the Orinoco, the Island of Trinidad, and the peninsula of Paria, a rocky extension of the Venezuelan coast range; communicates with the Caribbean by the Boca del Drago, or Dragon's Mouth (between Trinidad and the peninsula), and with the Atlantic on the SE. by the Boca de la Sierpe, or Serpent's Mouth. Columbus,

who discovered and named these straits, 1498, had great difficulty in passing through them owing to their strong currents. Here he first saw the continent.

Pariah (pā'rĭ-ă), one of the lowest class in India, which does not belong to any of the four castes. The pariahs have woolly hair and thick lips, and are found especially in the S. of India; they are supposed to represent the aboriginal race conquered by the Sudras. They are very degraded, are not allowed to approach within many feet of any Hindu, and have to some extent adopted a system of caste among themselves.

Pari'etal Eye, vestigial organ peculiar to vertebrates. In the brain of all vertebrates there is a structure of unknown functions, called the pineal gland. In certain lizards it reached nearly to the surface of the head, retaining in its most complete development lens, retina, pigment, and traces of a nerve. So far as is known this eye is no longer functional, but in some of the fossil vertebrates a cavity exists in the skull in the right position and of proper size to accommodate a third eye with its appropriate muscles.

Par'is, or **Alexan'der,** son of Priam, King of Troy, and Hecuba; carried off Helen, wife of Menelaus, King of Sparta, thereby bringing on the war between the Greeks and Trojans; in art he is represented as a youthful and handsome man; wounded during the siege by a poisoned arrow, he died before the capture of the city.

Paris (pă-rē'), **Louis Philippe Albert d'Orléans** (Comte de), claimant to the French throne; son of the Duc d'Orléans and grandson of King Louis Philippe, 1838–94; b. Paris; appeared with his mother in the Chamber of Deputies in Revolution of 1848, but his claims to the throne were not recognized; after traveling in Greece, Egypt, and the East, the prince and his brother, the Duc de Chartres, accompanied their uncle, the Prince de Joinville, to the U. S., August, 1861, and were attached to the personal staff of Gen. McClellan. They remained with the army for several months, serving with bravery and efficiency, especially in the battle of Gaines's Mill. In 1871 he was admitted to the National Assembly; in following year that body voted the restitution of the property of his family; 1873, he acknowledged the Comte de Chambord as the head of the royal house of France, but after the latter's death, 1883, the Comte de Paris united in his person the claims of both branches of the Bourbons, and was accepted by most of the legitimists as the successor of Chambord. He was again forced to leave France, 1886, by the Expulsion Act, and died in England. Author of "History of the Civil War in America."

Par'is, Matthew of. See MATTHEW PARIS.

Paris (French, pă-rē'), capital of **France**; on both sides of the Seine, 110 m. from the river's mouth; area, 30 sq. m.; pop. (1911) 2,888,110. In point of population it ranks next to London among European cities and in elegance it outranks them all. It lies in a basin between lines of heights, which reach 404 ft. on the N. and 190 ft. on the S. The Seine enters Paris on the W. and leaves it on the S., forming in its passage the islands of St.-Louis and La Cité. The climate is liable to changes at all seasons, but on the whole is healthful and agreeable; average temperature, 51° F. The Seine seldom freezes; generally there is skating for a few days only each year, and the snowfall is slight; average height of barometer 29.55 in. Paris is entirely surrounded by a fortified wall, which, with the first line of detached forts, was constructed, 1840–60. This line, comprising eighteen forts, is distant about 1,600 yds. from the city walls. The second line, built since the War of 1870–71, is several miles distant from the city, and consists of eighteen forts, placed on the various heights. The capital is now believed to be impregnable from a military point of view.

A railway belt encircles the city. The *boulevards exterieurs* form a line of broad and continuous road on the site of the old octroi wall. The most famous and the oldest of the avenues are the *boulevards interieurs,* which extend from the Madeleine to the Place de la Bastile, N. of the Seine. The thoroughfare of the boulevards of Sebastopol and Strassburg stretches N. and S. between the Gare de l'Est and the Seine, and then by the Boulevard du Palais and Boulevard St.-Michel reaches the observatory, length 2½ m. The Rue Royale, the Malesherbes and Hausmann boulevards, and the Avenue de l'Opera are among the finest quarters of the town. The Rue de la Paix, Rue Auber, Rue de Rivoli, and Rue 4 Septembre are remarkable for their shops. The Place de l'Étoile is the center of twelve avenues issuing from it like the spokes of a wheel. On the S. side the main thoroughfare is the Boulevard St.-Germain (the residence of the old nobility). The Quartier Breda continues to be the designation of the N. part of the Quartier de l'Opera and its vicinity, which comprises the Chaussee d'Antin, the headquarters of the moneyed aristocracy, and the select Faubourg Montmarte. The Quartier Latin (students' quarter), a nickname of the former Quartier St. Jacques, now forms part of that of the Panthéon, where are the Sorbonne, Val de Grace Church, and Jardin des Plantes. The old name of Quartier St. Antoine is still applied to the whole region of the Place de la Bastile. Here the working classes are in great force.

The Seine is crossed by many handsome bridges, including Notre Dame, occupying the site of a Roman bridge; the Pont d'Austerlitz; the Pont St. Michel, rebuilt several times since the fourteenth century; the Pont Neuf, begun 1578; the Pont Royal, constructed, 1685–89; and the bridge and viaduct of Anteuil. The multitude of promenades, places, gardens, and squares constitute the greatest charm of Paris. Among the most celebrated of them are the Gardens of the Louvre, and the Place Napoleon with its garden, surrounded by the ornate inner façades of the new Louvre, except on one side, which opens on the immense pal-

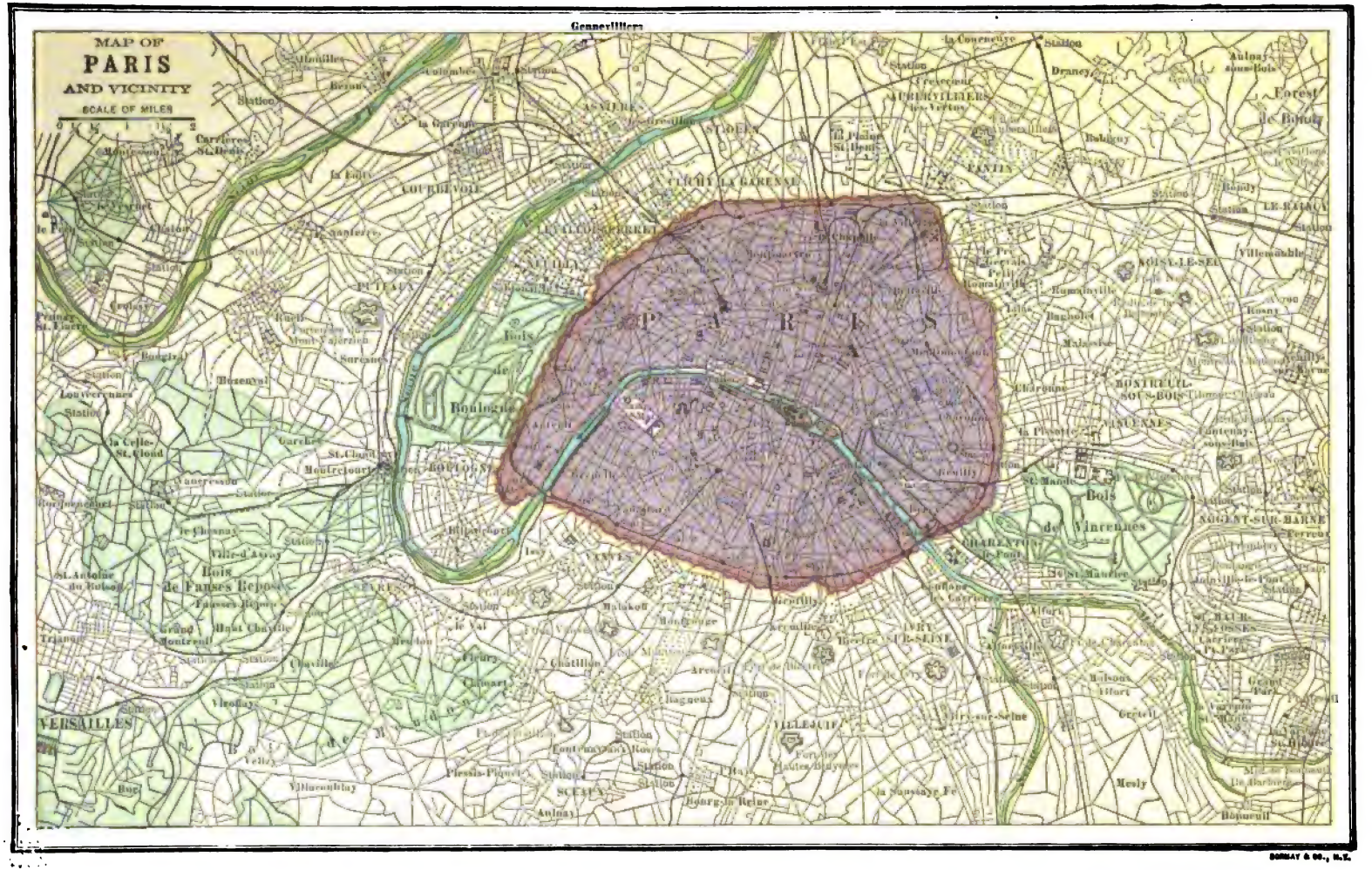
ace court called the Place du Carrousel, containing a famous triumphal arch. The gardens of the Tuileries and Luxembourg are especially fine. The finest square in Paris has been successively named Place de Louis XV, de la Revolution, and de la Concorde. The grand avenue of the Champs Élysées, farther W., is 1¼ m. long, planted with trees and laid out in parterres. Midway in its course the avenue spreads into a circular place (rond point), and thence continues to the Place de l'Étoile. Here is the Arch of Triumph, begun by Napoleon I and completed by Louis Philippe.

Prominent among the avenues radiating from the Place de l'Étoile is the celebrated Bois de Boulogne, 1 m. long and 300 ft. wide, which leads to the Bois de Boulogne Park, of 2,500 acres, just outside the fortifications. This contains a race course, Longchamps, where the Grand Prix is contested, and where the grand annual military review takes place. The aristocratic drive is the Allée des Acacias. The Garden of Acclimation, situated here, embraces the finest zoölogical collection in Paris. The Bois de Vincennes contains over 2,075 acres. In the center is a large field for military maneuvers and also a race course. The Champ de Mars, which used to be a sandy field for military maneuvering, is laid out as a public garden. It is surrounded by the principal buildings of the Exposition of 1889, and in the center is the Eiffel Tower. At the SE. end is the military school. The Jardin des Plantes, which is a little larger than the Tuileries, was first opened to the public 1650. To-day the botanical school has a reserve of nearly 5 acres filled with over 13,000 kinds of plants. A zoölogical collection forms a part of the garden. The Monceau Park is surrounded by some of the most fashionable streets and magnificent private residences of Paris. The Trocadero Park dates from the Exposition of 1878. Between the Rue de Rivoli and the Seine, opposite the Isle de la Cité, is the Hôtel de Ville, connected with nearly every important event in the city's history. It was constructed, 1533–1628, burned under the Commune, 1871, and rebuilt soon after.

The public monuments include the Column of July, a bronze pillar in the Place de la Concorde, dedicated to the citizens who fell in the Revolution of 1830; the obelisk of Luxor, removed from Egypt, 1833; the triumphal arch in the Place du Carrousel, commemorating the campaigns of 1805; and a reduction of Bartholdi's "Liberty Enlightening the World," a gift of citizens of the U. S., which stands on one of the islands in the Seine. Paris is rich in splendid palaces. Besides that of the Louvre are the Élysée, built 1718, now residence of the president of the republic; the Royal, completed 1634, now occupied by state bodies; the Luxembourg, built in beginning of the seventeenth century, with which is connected a public garden, and in an annex, a gallery of modern pictures and sculptures; the Bourbon, built 1722, where the Chamber of Deputies meets; and the Palace of the Institute, finished 1662, the abiding place of the Institute of France. There are nearly fifty museums and picture galleries, the most important being the Louvre, whose origin was a private collection of pictures belonging to Francis I. The National Library, the largest in the world, has upward of 3,000,000 volumes. The Ste-Geneviève, the Mazarin, the Arsenal, and the Opera libraries have very large collections. The drama being one of the chief sources of amusement in Paris, there are many theaters. Four of them, the Opera, Français, Opera Comique, and Odeon, receive state aid. The Opera is one of the finest theatrical edifices in the world.

The Panthéon may be considered the center of the Quartier Latin. Here, within five minutes' walk of one another, are the Sorbonne, the heart of the Univ. of Paris, the College of France, the special schools of law, medicine, mines, pharmacy, fine arts, Oriental languages, etc., the historic École Polytechnique, the École Normale Supérieure, etc. There are seventy parish churches, of which Notre Dame, the metropolitan cathedral, is the largest and most famous. Its corner stone was laid, 1163, by Pope Alexander III, but the edifice was not completed till nearly a century later. The Sainte Chapelle is perhaps the most beautiful structure in Paris; built by St. Louis to house the supposed crown of thorns and a portion of the true cross. St.-Germain-des-Prés is a remnant of the ancient abbey of that name; begun, 1001, but not completed till the twelfth century. There was a church on the site of St.-Germain-l'Auzerrois as early as 560. Some portions of the present edifice date from the twelfth century. On August 24, 1572, its bell rang out the signal for the massacre of St. Bartholomew. The Madeleine was begun by Louis XV, but was not opened till 1842. Napoleon I intended it to be a Greek temple, dedicated to the soldiers of the Grand Army. It is now one of the most richly ornamented and fashionable churches of Paris. The Church of the Sacred Heart on the heights of Montmartre is a large and conspicuous basilica in Byzantine style, whose construction was decreed, 1874, by the National Assembly. Of forty-five or more Protestant churches, the Oratoire is the most conspicuous.

Paris has nineteen cemeteries, thirteen of which are inside the walls. Of the latter, only three are of historic interest: Père Lachaise, Montmartre, and Montparnasse. The largest and most notable is the first named. It covers about 100 acres, and has the tombs, among those of other celebrities of Arago, Thiers, Rachel, Cuvier, Béranger, Molière, Ingres, and Balzac. The oldest of the Paris hospitals is the Hôtel-Dieu, founded about 660, contains nearly 600 beds. La Charité, founded 1602 by Marie de Médicis, is the chief lying-in hospital. St.-Louis dates from 1607, and is for patients suffering from skin diseases. The chief industries are the production of manufactures, as bronzes, jewelry, decorative furniture, and articles de Paris. The larger manufacturing establishments include engineering works, chiefly in connection with the railways, foundries, and sugar refineries. Among government works are two tobacco factories, national printing establishment, mint, Gobelins tapes-


MAP OF
PARIS
AND VICINITY
SCALE OF MILES
0 ½ 1 2
PARIS
Boulogne
Bois de Vincennes
Bois de Fausses Reposes
VERSAILLES
COURBEVOIE
PUTEAUX
SURESNES
BOULOGNE
ASNIERES
GENNEVILLIERS
CLICHY-LA-GARENNE
LEVALLOIS-PERRET
NEUILLY
PANTIN
LE RAINCY
BONDY
NOISY-LE-SEC
ROSNY
MONTREUIL-SOUS-BOIS
VINCENNES
CHARENTON
ALFORT
MAISONS-ALFORT
SAINT-MAURICE
SAINT-MANDE
VILLEJUIF
IVRY-SUR-SEINE
CHATILLON
MEUDON
CLAMART
SCEAUX
ANTONY
BOURG-LA-REINE
MESLY
BONNEUIL
Genneviliers

BORRAY & CO., N.Y.

try factory, and dye works. Next come the chemical factories, printing offices, cabinet-makers' workshops, tailoring establishments, and hat factories. Goods arriving by the Seine are chiefly building materials, timber, grain, coal, coke, charcoal, and wines; building materials and flour are brought by the Canal de l'Ourcq, and coal and coke from the N. of France, Belgium, and England by the Canal St.-Denis. By the Seine, Paris dispatches manure, pyrites, and refined sugars. To the traffic of the river should be added that of the canals, especially of La Villette, on the canals St.-Denis and Ourcq.

The city was a fishing village, on what is now called the Ile de la Cité; was inhabited by the Gallic tribe of the Parisii, and was known to the Romans as Lutetia. The first historic mention of Paris occurs in 52 B.C., when Cæsar says in his "Commentaries," "Labienus leaves for Lutetia with four legions. This is the fortress of the Parisii, situated on an island in the river Seine." At the end of the fourth century Lutetia had become the seat of a bishop, and was called Paris, from the name of the little nation whose capital it was. In 506 Paris became the residence of Clovis, and later Charlemagne sometimes visited it, though in his time it ceased to be the capital. In 885–886 30,000 Normans encamped in front of the Ile de la Cité, which was besieged, but in vain, during thirteen months. In 987 Hugh Capet, the first of the dynasty, made Paris the capital of his kingdom, and his successors resided there. During the reign of Philip Augustus, 1120–1223, the city's growth was great. The streets were then first paved with stone, three colleges were founded, and soon 20,000 students flocked to the city from all parts of France and foreign countries. This was the foundation of the university.

Under Louis IX, 1215–70, was founded a theological college, which became the celebrated Sorbonne. Philip the Fair added greatly to the importance of the city by making it the seat of the highest court in the kingdom—the Parlement, which he organized in the opening years of the fourteenth century. During the reign of Charles IX, 1560–74, religious and civil wars checked the development of the city, and Henry III in the closing years of his reign found himself excluded from his own capital, which fell completely under the control of the League. Both he and his successor, Henry IV, were obliged to lay siege to it, the second siege lasting four years, and bringing terrible sufferings on the inhabitants, 1590–94. During the minority of Louis XIV the city sustained another siege, and suffered from frequent riots in the streets. (See FRONDE.) The centralizing policy of Louis XI and his opposition to the residence of the nobility on their estates drew to Paris the most brilliant and distinguished men of France. From his time the history of the city becomes in a sense the history of France, and for an account of the principal events see that title. Paris suffered severely from the excesses of the revolution, whose worst crimes were committed within its limits. It was the scene of the revolutions of 1830 and 1848, and it suffered from siege in the Franco-German War and from the violence of the Commune.

In the World War the city was the prime objective of the Teutonic invaders, and because of the open threats against it the seat of the French government was removed to Bordeaux, Sept. 3, 1914, but was returned Dec. 9 following. Mainly through the skill of the late GEN. JOSEPH S. GALLIENI (*q. v.*) the city was saved at the most critical moment of the early operations, and later it was again preserved by MARSHAL JOSEPH JOFFRE (*q. v.*), by his checkmating the enemy in the great battles of the Marne and the Somme. After the armistice the momentous Peace Congress was held here. See WORLD WAR REVIEW.

Paris, Declara'tion of. See DECLARATION OF PARIS.

Paris Green. See SCHWEINFURTH GREEN.

Paris Yel'low. See CHROMIUM.

Par'ish, Elijah, 1762–1825; American geographer; b. Lebanon, Conn.; became pastor of the Congregational Church at Byfield, Mass., 1787; belonged to the party called in his day the Hopkinsian. His works include a "Gazetteer of the Eastern and Western Continents," in conjunction with the Rev. Dr. Morse; a "History of New England," "System of Modern Geography," and "Sacred Geography, or Gazetteer of the Bible."

Park, Mungo, 1771–1806; Scottish traveler; b. Fowlshiels; under auspices of the African Association, London, was the pioneer in modern exploration of Africa; journeyed up the Gambia, 1795, suffering extreme hardships, and being a prisoner for some time in the hands of a Moorish king; escaping July 1, 1796, reached the upper Niger, at Segu, and followed the river toward Timbuktu as far as Silla, where he was compelled to turn back; after seven months' illness and great hardships, reached the mouth of the Gambia, having been nineteen months in the interior. The British Govt. sent him, 1805, to descend the Niger from the upper river and trace its entire course. The party sailed down the river some 1,500 m., when they were attacked by natives, and Park and all his company perished.

Park, in the usual sense of the term, a considerable extent of ground laid out and maintained as a public pleasure ground. In the course of its development first comes the glade and meadow with woods and waters where the hunter seeks his game. Inclosed by wall or fence this becomes the *chace,* and is still mainly devoted to the preservation of game. Finally the desire for open-air pleasures felt by the home dweller asserts itself, and walks and resting places are made for the quiet enjoyment of outdoor features. In this way at last came the gentleman's country place of today. Notwithstanding this increasing desire for the peaceful enjoyment of woods and waters, paths and resting places, there still remained the green or common. This continued to exist, but beside it grew up the park mod-

cled on the gentleman's country place, and comprising certain other features, such as roads and open spaces, required for public use.

The Egyptians doubtless had parks earlier than the earliest records on their monuments. Their parks were formal, rectangular, little more than promenades full of architectural features, colonnades, and sculptured objects of diverse form and significance. Parks to them meant little more than a cluster of gardens. In the mountainous regions of Assyria glimpses of the modern idea of a park began to appear. Idealized conceptions of the mountain idea have been ascribed to the "hanging gardens of Nebuchadnezzar," and the paradises of the Assyrian Semiramis and the later Persians with wild animals and birds, trees and flowers, approached still nearer the park of modern Europe. The Greeks derived much of their science and art from Egypt, and their landscape architecture apparently came in large part from the same source. The Romans developed a great love for parks, and Rome became in the time of the Cæsars one great pleasure ground. Lanciani says that there were at this time eight campi or commons for foot races and thirty parks or gardens belonging to the city. The largest common was the Campus Martius, a vast level space, with buildings, playgrounds, and waterworks on an extraordinary scale, surrounded by miles of sumptuous colonnaded porticoes inclosing beautiful gardens. The Golden House of Nero included miles of gardens in the very heart of Rome. In every direction the architectural masses were broken and enframed by the green of gardens and parks, while the water was used in canals, fountain basins, and cascades to an extent unknown before or since.

In the U. S. park construction has long been a wise feature of municipal governments, and in the majority of large cities there are park systems completed or in process of construction, usually comprising a cluster of parks with connecting boulevards. In the most thickly settled parts of large cities sanitary science has compelled the creation of "city lungs," and as a result small parks and recreation grounds are already common. City squares are hardly recognized as parks in the usual sense of the term. They must be somewhat more formal in effect on account of the proximity of city buildings, but the principles on which they are constructed should be the same as those of the largest parks. The boundaries should be planted with a series of masking trees and shrubs, and as much open lawn secured as the general design will permit. Architectural structures, statues, and fountain basins find an appropriate home in the small squares of the city. Around these structures brilliant beds of cannas, geraniums, and begonias may be arranged in an effective manner. Among the best-known parks of the present day are Hyde Park (with Kensington Gardens), 598 acres; Regent's Park, 472 acres; Victoria Park, 300 acres; Battersea Park, 250 acres, all in London; Princess Street Gardens, Edinburgh; Phœnix Park, nearly 2,000 acres, Dublin; Central Park, 862 acres, Bronx Park, 661 acres, New York; Prospect Park, 515 acres, Brooklyn; Thier Garten, 200 acres, Berlin; the Bois de la Cambre, 124 acres, Brussels; the Garden La Flora, Cologne; the English Garden, 500 acres, Munich; the Prater Gardens, 1,500 acres, Vienna; Paulovsk Park, near St. Petersburg; the Bois de Boulogne, 2,000 acres, and Bois de Vincennes, 2,075 acres, Paris. U. S. national parks have a total area of about 4,606,000 acres. The most important are Yellowstone National Park, Wyoming; Yosemite and Sequoia national parks, California; Glacier National Park, Montana; and Mount Rainier National Park, Washington.

Par'ker, Alton Brooks, 1852– ; American jurist; b. Cortland, N. Y.; settled in Kingston, N. Y.; Surrogate of Ulster Co., 1877–85; became Judge of the Supreme Court, 1885; Court of Appeals, 1889; General Term, 1893, and Appellate Division, 1896; delegate to the Democratic National Convention, 1884; chairman of the state executive committee, 1885; unsuccessful candidate for President of U. S., 1904, carrying thirteen states, with 140 electoral votes.

Parker, Francis Wayland, 1837–1902; American educator; b. Piscataquog, N. H.; served in Union army through Civil War; principal normal school, Dayton, Ohio, 1868–72; superintendent schools, Quincy, Mass., 1875–80; principal Cook Co. (Ill.) Normal School, 1883–96, Chicago Normal School, 1896–99; president Chicago Institute, 1899, till death; author of "Talks on Teaching," "How to Study Geography," "Outlines in Geography," "Talks on Pedagogics," "Uncle Robert's Geography," etc.

Parker, Theodore, 1810–60; American theological leader; b. Lexington, Mass.; settled at W. Roxbury as pastor of the Second (Unitarian) Church, 1837; soon arrived at religious views widely differing from those of conservative Unitarians; stated the principles of his transcendental system in lectures delivered at Boston, 1841; published under the title "A Discourse of Matters Pertaining to Religion"; followed, 1842, by a series of "Sermons for the Times"; wrote articles in *The Dial*; published a volume of "Critical and Miscellaneous Writings" and a translation of De Wette's "Introduction to the Old Testament." Opposition to his admission to the pulpits of several churches led him to establish an organization at Boston, known as the Twenty-eighth Congregational Society, Boston, 1846. He founded and edited for three years the *Massachusetts Quarterly*; was indicted in the U. S. court, 1854, for resistance to the Fugitive Slave Law in the case of Anthony Burns, the offense being an address at Faneuil Hall, but was never brought to trial.

Par'kersburg, capital of Wood Co., W. Va.; at confluence of the Ohio and the Little Kanawha rivers; 96 m. S. by W. of Wheeling; in a rich oil and natural-gas region; contains seminary, Academy of the Visitation, U. S. Govt. building, shops of the Ohio River Railroad, oil refineries, machine shops, iron foundries, boiler shops, lumber mills, furniture factory, and acid works. The Ohio River is here crossed

by a railway bridge over 1½ m. long, excluding approaches, which cost over $1,000,000. Pop. (1910) 17,842.

Parkes, Sir Henry, 1815–96; Australian statesman; b. Stoneleigh, England; went to Sydney, New S. Wales, 1839; elected to colonial Parliament, 1854; went to England as Commissioner of Emigration, 1861; on return, reëlected to Parliament; Premier, 1872–75, 1877–78, 1878–83, 1887–89, and 1889–91; during last ministry actively promoted colonial confederation, but did not live to see its accomplishment.

Park'man, Francis, 1823–93; American author; b. Boston, Mass.; started to explore the Rocky Mountains, 1846; lived for several months among the Dakota Indians and the still wilder and remoter tribes, and incurred hardships which made him an invalid for life; published "Prairie and Rocky Mountain Life" (reissued as "The California and Oregon Trail"), "The Conspiracy of Pontiac," "Pioneers of France in the New World," "Jesuits in North America," "Discovery of the Great West," "The Old Régime in Canada," "Count Frontenac and New France Under Louis XIV," "Montcalm and Wolfe," and "A Half Century of Conflict."

Par'ley, Peter. See GOODRICH, SAMUEL GRISWOLD.

Par'liament, originally a meeting or assembly for conference or deliberation; afterwards applied in France to the principal judicial courts, and in England to the legislature of the kingdom. The word, or one very like it, was long in use in France, and was first applied there to general assemblies in the time of Louis VII, about the middle of the twelfth century. General councils existed in England under various names from the earliest Saxon times; but the word parliament first occurs in the statute of Westminster, 1272, and the present constitution of Parliament did not exist till early in the fourteenth century. The Imperial Parliament of the United Kingdom of Great Britain and Ireland is composed of the crown and the three estates of the realm—the lords spiritual, the lords temporal, and the commons. It is the prerogative of the crown to convoke, continue, or dissolve it. No Parliament can last longer than seven years, and writs for summoning a new one must issue within three years from the dissolution of the last one. The sessions may be suspended by adjournment or prorogation, and ended by dissolution. In practice, Parliaments assemble annually, and sit during the first half of the year.

The House of Lords is composed of the lords spiritual and temporal, the former consisting of the archbishops of Canterbury and York and twenty-four bishops of the Church of England; the latter of hereditary peers, representative peers of Scotland and Ireland, and lords of appeal in ordinary. Scottish peers elect sixteen representatives after every general election, who sit till Parliament is dissolved; Irish peers elect twenty-eight representatives for life. The House of Lords has both legislative and judicial powers, and is the highest appellate court in the kingdom. Full membership (1918) 680. The House of Commons consists of members representing the county, borough, and university constituencies in the three divisions of the kingdom. No candidate requires any property qualification, and members receive an annual salary. In its method of work the Commons is similar to the U. S. House of Representatives. The Speaker never joins in debate, except on rare occasions when the House is in committee of the whole, and never votes excepting to decide a tie. He has a residence and £5,000 per annum, serves till a dissolution, and on retirement is usually given a pension of £4,000 per annum and a peerage. Full membership (1918) 670.

Parliamen'tary Law, the law governing the proceedings of deliberative assemblies. Among English-speaking people it is derived from the practice of the English Parliament. In the U. S. the old English parliamentary law has been gradually modified in practice. New motions have been introduced and others so changed as to preserve only their old name; thus to *reconsider* is purely a new motion designed to counteract partially the evil incident to hasty action; while the *previous question* has so completely changed that in the U. S. it is demanded by those who intend to vote for it, while in Great Britain it is demanded by those who vote against it. To avoid confusion, every deliberative assembly should adopt some published work as its authority on all points of parliamentary law not covered by its own special rules. It will generally be found best to supplement the adopted authority by some rules adapted to meet the special wants of each separate organization. As a general rule, parliamentary law in the U. S. is based upon the rules and practice of Congress, except where they are evidently not adapted to a *bona-fide* deliberative assembly, when recourse must be had to the old common parliamentary law and the best practice.

Officers.—The necessary officers of a deliberative assembly are a presiding officer or chairman (called president, speaker, moderator, etc.) and a recording officer, usually known as secretary or clerk. It is the duty of the chairman to call the assembly to order; preside over the meetings; state every question coming properly before the assembly previous to recognizing a member to speak or make another motion; put to vote the questions before the assembly; announce the business before the assembly; enforce the rules; preserve order and decorum; and decide all questions of order and practice, subject to an appeal by any two members. The chairman should rarely participate in the debate. He can vote whenever his vote would affect the result and whenever the vote is by ballot. It is the duty of the secretary to record the proceedings, including every resolution adopted and the names of members of committees appointed. The official records and other documents of the assembly are in the custody of the secretary, but they are open to inspection by members, and the chairman may direct certain ones to be turned over to a com-

mittee that needs them. The record should be signed by the secretary, or, in his absence, by the secretary *pro tem.*

The Resolution of Motion.—Business is usually brought before the assembly in the form of a *resolution* offered by a member. The question on its adoption is called the *main* or *principal* question. A resolution should always begin with the words "*Resolved, That.*" When it is desired to give a reason for the resolution, this reason should be placed in a paragraph preceding the resolution, called the preamble, which should begin with "Whereas" and end with "therefore" or "therefore, be it." The preamble, as well as the resolution proper, is included in the term resolution. In order to offer a resolution it is necessary for the member to rise in his place and address the presiding officer by his proper title. The chairman then recognizes him by announcing his name or by bowing to him; in legislative bodies a member is recognized or referred to as the member from such and such a district. No member is entitled to make a motion or speak until recognized. It is customary to require important motions to be seconded in order to prevent wasting of time on questions favored by only one member. It is not necessary to obtain the floor for this, but any member in his seat can say, "I second the motion." In Congress such seconds are not required. The chair now clearly states the question before the assembly, after which he recognizes the mover of the motion as having the floor, or the member who first rises and addresses the chair.

Precedence.—During the consideration of a question it is not in order to introduce any other principal question, but it is allowable to make other motions that will aid in disposing of the main question, or that arise incidentally, or that relate to the enforcement of the rules, or to the privileges of the assembly, or to closing the meeting, or to the time of the next meeting. The most common of these have the following order of precedence, any one being in order (except to amend) when one of lower rank is pending, and everyone being out of order when one of higher rank is pending: To fix the time to which to adjourn, adjourn, orders of the day, lay on the table, previous question, postpone to a certain time, commit or refer, amend, and postpone indefinitely. Questions incidental to those before the assembly take precedence and must be decided first.

Debate.—Every motion is debatable, except such as from their nature cannot be debated without injury to the business before the assembly. Debate cannot be allowed on highly privileged motions, as to adjourn, or they could be used to prevent the assembly from transacting any business. A motion to close debate must necessarily be undebatable, or its very object could be defeated. The following motions cannot be debated: Fix the time to which to adjourn; adjourn; for the orders of the day and questions relating to priority of business; appeal when previous question is pending or when relating to indecorum or to transgression of rules of speaking or to priority of business; objection to consideration of question; lay on the table or take from the table; previous question, and all motions extending, limiting, or closing debate or allowing one to continue speaking after being guilty of indecorum in debate; reconsider an undebatable question; question relating to suspending the rules, withdrawing a motion, or reading papers. Debate must be confined to the one question before the assembly at the time, other questions being discussed only so far as they have a bearing on the question immediately before the assembly, except that when the decision of the pending question finally disposes of the main question, then the latter is open to debate also.

Amendments.—The assembly can modify the main question by adopting amendments, or it may be referred to a committee who can report amendments for adoption by the assembly. An amendment may be by adding or inserting, by striking out, by striking out and inserting, by substituting, or by dividing the question. An amendment may itself be amended, but not so as to alter its form, nor can any parliamentary motion be amended so as to become a motion of another form. An amendment of an amendment cannot be amended. While an amendment is pending it is not in order to make another motion to amend the resolution, but after one amendment is disposed of another can be offered.

Postponing and Suppressing Questions.—Action upon a question may be deferred by postponing it to a certain time; or it should be laid on the table; or it should be made a special order for a certain time, which motion requires a two thirds vote for its adoption. The assembly may suppress the question as follows: (*a*) When first introduced, before debate or action thereon, any member may, even while the mover has the floor, object to the introduction of the question, and if the objector is sustained by a two thirds vote the question is dismissed for that session, thus enabling the assembly to avoid having its time taken up with irrelevant or profitless questions. (*b*) After the question has been debated, the proper way to suppress the question is to vote it down or postpone it indefinitely, except that if it fails the original question is not adopted, as it would have been had the vote been taken on adopting the main question. Since to postpone indefinitely opens the main question to debate, when this motion is made with a view of suppressing the question immediately, it is necessary also to demand the previous question, just as it is when it is desired to bring the assembly to an immediate vote on the main question. (*c*) While a two thirds vote is required to suppress the question without free debate, yet in most cases it can be practically accomplished by a majority vote on the motion to lay the question on the table. In the U. S. Congress, where the calendar is so full and party lines strictly drawn, the most common method of killing a question is to lay it on the table. In voluntary organizations, where mutual good feeling and coöperation are desired, questions should not be suppressed without debate unless by a two thirds vote,

and the motion to lay on the table should be confined to its strict parliamentary use of laying aside a question to be taken up at a more convenient time. Where it is desired to kill simply an amendment, it will not do merely to lay it on the table, as this carries with it the resolution also.

Reconsideration.—To protect the assembly from having questions reintroduced repeatedly at the same session, and yet to give reasonable freedom for correcting errors due to hasty action, parliamentary law in the U. S. provides that no principal question (resolution or report) or amendment that has been once acted upon shall be again taken up at that session except by a motion to reconsider or rescind; but the motion to adjourn can be renewed if there has been progress in debate or any business transacted.

Adoption of Motions.—A majority of the votes cast when a quorum is present is all that is necessary, in the absence of a special rule to the contrary. A quorum, or the number that must be present in order that business may be transacted, is a majority of all the members of the organization where there is no number specified by rule, which should always be done. The following motions come under the above exception and require a two thirds vote: To amend or suspend the rules; to make a special order or take up a question out of its proper order; to object to the consideration of a question; to close or limit or extend the limits of debate; and the previous question.

Committees.—If an assemblage has much business to transact, its work can be expedited by having questions first considered by committees, which may be standing (appointed for a term, as a year or session), or select (one for a special purpose), or committee of the whole (*i.e.*, the whole assembly). If a committee chairman has not been appointed by the assembly, the first member named, and in his absence the next, should act as chairman, unless the committee elect some one else. If the committee is one for action, it should be small and contain only friends of the object for which it was appointed; if for deliberation or investigation, it should be larger and all sides should be fairly represented. In committee the chairman usually takes the most active part; members do not rise to speak, motions are not seconded, and in small committees they are not always made, but they should be voted upon; the chairman usually votes.

Par'ma, Dukes of. See FARNESE.

Parma, province of Italy; bounded N. by Lombardy, E. by Modena, S. and W. by Tuscany; between the Po and the Apennines; area, 1,250 sq. m.; pop. (1908) est. at 297,970; capital, Parma; chief rivers, Po, Taro, Euza; products, wine, oil, fruits, rice, timber, marble, alabaster, copper, and salt; manufactures, silk; Parmesan cheese largely exported. Under the Romans the territory formed part of Cisalpine Gaul. Charlemagne ceded it to the pope. It became independent during the wars between the Holy See and the German emperors, and was ruled by local dynasties till 1346, when it fell into the hands of the Visconti of Milan. Pope Julius II obtained it, 1511, and Paul III gave it, 1545, to his son Pietro Luigi Farnese, whose successors held the duchies of Parma and Piacenza till 1731, when Elizabeth Farnese, wife of Philip V of Spain, obtained them for her son Don Carlos; but when he became King of the Two Sicilies they were annexed to Austria (1735), and, 1748, the duchies along with Guastalla, were assigned to Don Philip, brother of Don Carlos. Philip was succeeded, 1765, by his son Ferdinand, on whose death, 1802, they were annexed to France. In 1814 the three duchies were bestowed on the ex-Empress of France, Maria Louisa. Duke Charles of Lucca succeeded her in Parma and Piacenza, 1847, and resigned, 1849, in favor of his son Charles III. The latter was assassinated, 1854, and his son Robert succeeded him. He was deposed, 1859, and, 1860, Parma and Piacenza were annexed to the dominions of Victor Emmanuel as separate provinces. **PARMA,** the capital of province, is on the Parma River, 79 m. SE. of Milan; is circular in form, surrounded by ramparts and bastions, and has a citadel, built 1591. The Via Emilia crosses it from E. to W. The streets are broad and in good condition, squares large, and there is a public promenade near the citadel, on the S. side of the town, and a public park in the NW. angle. Among the public buildings is the Cathedral of the Assumption (Roman Byzantine, begun 1060), which contains, among other superior works of art, many frescoes by Correggio, much restored; the baptistery (begun 1196), a fine specimen of Lombard architecture; the Church of S. Giovanni Evangelista, with frescoes by Correggio; the Madonna della Steccata, a church of the Renaissance, containing sepulchral monuments of the Farnese and Bourbon rulers of Parma and a celebrated picture by Mazzuoli. The Municipal Museum, the Academy of Fine Arts, the School of Design, and the Farnese Theater are in the great building known as the Pilotta, intended to form a part of a colossal ducal palace never completed. There is also a university, founded 1521, and a royal public library. Pop. (1907) 49,340.

Parma, Duchy of. See **PARMA** (province).

Parmen'ides, son of Pyrrhes; the most notable of the philosophers of the Eleatic School; b. at Elea, Lucania, about the year 519 B.C. He took an active part in the government of his native city and drew up a code of laws, to which the Eleans annually swore to conform. He disseminated his philosophy both by teaching and writing. According to Plato, he was personally acquainted with Socrates.

The only work of Parmenides known to the ancients was that bearing the title "On Nature," written, according to the custom of the time, in dactylic hexameters. It was divided into three parts: (1) An introduction, describing in highly figurative language the manner in which the philosopher reached the citadel of truth; (2) a treatise "On Truth"; and (3) a treatise "On Opinion."

Parmenides was, with the exception perhaps of Heraclitus, the greatest of the pre-Socratic thinkers. The kernel of his thought is the no-

tion of pure Being, which he identifies with pure Thinking, and labors to define by every means afforded by the undeveloped philosophic diction of his day. Pure Being, the common basis of finite existence and finite Thought, alone *is*. Nonbeing and all the array of finite thoughts and things which its assumption entails are delusions, unavoidable perhaps for the uncultured mind, but transparent enough to the true thinker.

Parme'nio, abt. 400–330 B.C.; Macedonian general; was favorite of Philip; second in command when Alexander invaded Asia; completed subjugation of Media while the king was pursuing Darius in Parthia and Hyrcania; was assassinated.

Parmigiano (pär-mē-jä'nō), **Il** ("The Parmesan"), real name FRANCESCO MAZZUOLI, or MAZZOLA, 1503–40; Italian painter; b. Parma; at age of fourteen painted a remarkable "Baptism of Christ"; became a pupil of Correggio; early went to Rome, where among other works he executed a "Circumcision of Christ" for the pope; after the sacking of Rome, 1527, he worked in Bologna; there produced some of his best works, also many wood engravings and designs for goldsmiths. In 1531 he returned to Parma, where he executed many fine works. He abandoned painting for alchemy, and being condemned to prison on various charges fled to Cassalmaggiore, where, after painting a "Madonna" for St. Stephen's and a Roman "Lucretia," he was repossessed by the mania for alchemy, and after dissipating his fortune, died of melancholia.

Parnahyba (pär-nä-ē'bä), river of Brazil, separating states of Piauhy and Maranhão; flowing NE. and entering the Atlantic near lat. 3° 15′ S.; length about 850 m. Basin of 135,000 sq. m. embraces all of Piauhy, in which it has many affluents, and 20,000 sq. m. in Maranhão. It has few rapids, and during the annual floods canoes can ascend to head of main river. Much of the commerce of Piauhy is by this route.

Parnas'sus, mountain of Greece; district of Phocis; rising 8,068 ft. above the sea. Its three peaks are covered with snow the greatest part of the year; its sides are covered with beautiful forests and abound in crags and caverns. In ancient times it was consecrated to Apollo and the Muses. Delphi, with its famous oracle and the Castalian fountain, was on its SW. slope. The Corycian cavern, the abode of Pan and the Muses, was on its W. slope, and on its highest top were celebrated the wild orgies of Dionysus.

Par'nell, Charles Stewart, 1846–91; Irish statesman; b. Avondale, Wicklow; grandson on mother's side of Rear Admiral Charles Stewart, U. S. navy. He entered Parliament, 1875; introduced bill to facilitate purchase of their holdings by tenantry of disestablished Irish Church, 1877; on its rejection, became leader of the obstructionists in Parliament; founded Irish National Land League, 1879, and became its president; on reëlection, 1880, chosen leader of the Irish party; opposed Crimes and Land Acts, 1881; arrested and imprisoned six months; organized National League, 1883; led Irish Parliamentary party, 1884–85; supported Gladstone's Home Rule Bill, 1860. He was charged by *The Times* with complicity in crimes by Irish tenantry, 1887; acquitted by commission on investigation, 1888; obtained £5,000 damages from *The Times*; involved in a divorce scandal and superseded as party leader by Justin McCarthy, 1890. See HOME RULE; LAND LEAGUE.

Parole', in law, a term used generally to designate oral evidence as distinguished from written evidence, but also to designate any contract or agreement, either oral or in writing, which is not under seal. Pleadings formerly when given *viva voce*, orally, in court were frequently termed the *parol*.

Paropam'isus, or **Paropamisan' Moun'tains,** in ancient geography, a name of uncertain signification, sometimes limited to the range which forms the N. boundary of Kabul, sometimes extended to the whole group connecting the Caucasus with the Himalaya, but generally corresponding to the modern Hindu Kush.

Paroquet (pär'ō-kĕt), popular name for numerous small parrots with rather long, wedge-shaped tails. While the word has no exact scientific meaning, it is used to distinguish

ALEXANDRINE PAROQUET.

those birds with wedge-shaped tails from the parrot, macaw, lory, and cockatoo, which, as a rule, are names applied to larger birds, usually with square tails.

Pa'ros, island of Greece; one of the Cyclades; 5 m. W. of Naxos; area, 80 sq. m.; most famous for its production of Parian marble. The Arundel or Oxford marbles, which give the Greek chronolo.. from Cecrops to Alexander, were discovered here, 1627. Pop. abt. 7,700.

Parot'id Gland, largest of the salivary glands in man as well as in many other animals. In the human subject the parotids lie on the sides of the face, below and forward of the ear. Each gland weighs about 1 oz., and discharges

its secretion by a duct 2½ in. long, called the duct of Steno, which opens on the inside of the cheek, opposite the second molar tooth of the upper jaw. The parotid secretion in man is less viscid than the saliva of the other glands, and differs somewhat in its composition, but its functional uses are essentially similar. The most important disease of the parotid is mumps.

Parr, Catharine. See CATHARINE PARR.

Parr, Thomas (OLD PARR), 1483–1635; alleged example of extreme longevity; b. Wilmington, Shropshire, England; was a farmer; married at age of one hundred and twenty; introduced at court shortly before his death as being one hundred and fifty-two years old, and as having lived through the reigns of ten sovereigns; buried in Westminster Abbey.

Parr, young of the salmon and trout, after it has passed the fry stage and before it has reached that of smolt.

Parrakeet (păr'ră-kēt). See PAROQUET.

Parrhasius (păr-rā'shĭ-ŭs), Greek painter; b. Ephesus; contemporary and rival of Zeuxis; flourished 400–380 B.C. While Zeuxis deceived the birds by his painted grapes, Parrhasius deceived Zeuxis himself by his painting of a curtain.

Par'ris, Samuel, 1653–1720; American clergyman; b. London; emigrated to Massachusetts in youth; merchant at Boston; became a minister; obtained notoriety through the great delusion called Salem witchcraft, which originated in his family, his daughter and niece having accused an Indian slave from the W. Indies of bewitching them. He was active in prosecuting those who were apprehended, and afterwards his church brought charges against him. He acknowledged his error, but, 1696, was dismissed and left the place.

Par'rot, any bird of the order *Psittaci*, which divided into three families: *Psittacidæ*, the true parrots; *Stingopidæ*, owl parrots; and *Cacatuidæ*, cockatoos. The large species, with long, pointed tails are termed macaws, the smaller paroquets or lories; the large, crested, square-tailed species are known as cockatoos. Parrots are distinguished by their stout, hooked bills, which are hinged upon the cranium; by their short legs and rough feet, and by having the outer toe turned backward. There are more than 350 species, found most abundantly in the tropics, but also, as in Australia and New Zealand, occurring in the temperate zone. America has the most species, 150; Australia is richest in peculiar genera; no parrots are found in Europe, and they are not common in Africa or Asia. Many species are gaudily colored. The most delicately colored forms are among the lories of the Australian region. Their food consists largely of fruit, but they also eat nuts, seeds, and buds, while a few eat insects and occasionally flesh. Unlike those of most birds their tongues throughout are soft and fleshy. Their voice is naturally loud and harsh, but many can be taught to articulate words, even with some intelligence. The African gray and Mexican "yellow head" are among the best talkers. There are recorded instances of parrots that have lived ninety years. A single species, the Carolina paroquet (*Cornurus carolinensis*), occurs within the limits of the U. S., and this is threatened with extermination. It is 12 or 13 in. long, half of this being due to the long tail; the prevailing color is green; the head is yellow and the cheeks are red.

CAROLINA PARROT.

Par'rott, Robert Parker, 1804–77; American inventor; b. Lee, N. H.; graduated at West Point; assistant professor there till 1829; transferred to the ordnance corps, 1836, resigned and became superintendent of the West Point iron and cannon foundry, Cold Springs, N. Y.; invented system of rifled guns bearing his name, and of their projectiles.

Par'ry, Sir William Edward, 1790–1855; English Arctic explorer; b. Bath; in naval service on the American coast during the War of 1812; member of Sir John Ross's Arctic expedition, 1818; commanded expedition, 1819–20, with which he penetrated farther W. within the Arctic circle than any previous explorer, thereby gaining a reward of £5,000 offered by Parliament; made other expeditions, 1821–23 and 1827, in one of which he attained the highest N. point (82° 45′ N. lat.) then reached. He was knighted, 1829; made rear admiral, 1852; Governor of Greenwich Hospital, 1853. He wrote "Journal of a Second Voyage for the Discovery of the Northwest Passage" and "Narrative of the Attempt to Reach the North Pole in Boats," etc.

Par'sees, the modern followers of Zoroaster. When, 651 A.D., the last of the Sassanides, Yezdezird, was defeated by the caliph Omar in the battle of Nahavand, and Persia was conquered and subjugated by the Arabs, the whole population was converted to Islam. Only a small number of the Persians clung to the national faith, and these were subjected to persecution. The Mohammedans called them Guebres, "infidels," and allowed them to settle only in the poorest districts of the country, around Yezd and Kirman. Most of them, however, emigrated to the W. coast of India and settled at Bombay, Surat, Nawsari, Ahme-

dabad, etc. Those remaining in Persia were hard pressed; they had decreased in numbers and sank into poverty. At present they are respected by the Europeans for their honesty and reliability. Those who went to India prospered much, though at one time they too were persecuted by the Mohammedans. They are said to number at present abt. 90,000, and many of the wealthiest merchants of Bombay belong to their denomination. In India, however, their religion became mixed up with Hindu ideas and practices, which occasioned a schism and the establishment of a reform association.

Pars'ley, biennial umbelliferous herb cultivated in gardens of several varieties; leaves

PARSLEY.

of most used in garnishing meats; others sometimes cultivated for the rich white root, which resembles the parsnip; root of common parsley has medicinal qualities.

PARSNIP.

Pars'nip, umbelliferous plant (*Pastinaca sativa*), usually biennial, found wild in S. and central Europe, in England, and in the S. parts of Russian Asia. There is much difference between the wild and the cultivated parsnip, the root of the latter being larger, without branches, softer, and more fleshy. The Guernsey parsnip has a root 4 ft. long; the Dutch, only from 20 to 30 in. To many this root is a great relish; to others it is distasteful on account of its sweetness. As fodder it possesses value for some kinds of stock. The wild parsnip has an acrid taste. It sometimes has malignant consequences when eaten, and often causes when touched an eruption on the skin similar to that of poison ivy; the cultivated assumes the same acrid taste when it begins to grow in spring. There are only three or four important named varieties in cultivation in the U. S.

Par'son, in English ecclesiastical law, strictly, a parish priest of the Established Church in England, who, in addition to his spiritual functions, has the legal ownership and possession of all the temporal rights belonging to the parochial church. He is called parson because by his person the church is represented, and he is in himself a corporation sole, in order to protect the rights of the church, which he personates by a perpetual succession. The word parson is now popularly used to signify any clergyman or person authorized by ecclesiastical authority to preach. In the technical sense, instead of the term parson, the word rector (that is the person who has the direction of the affairs of the church) is now more commonly used.

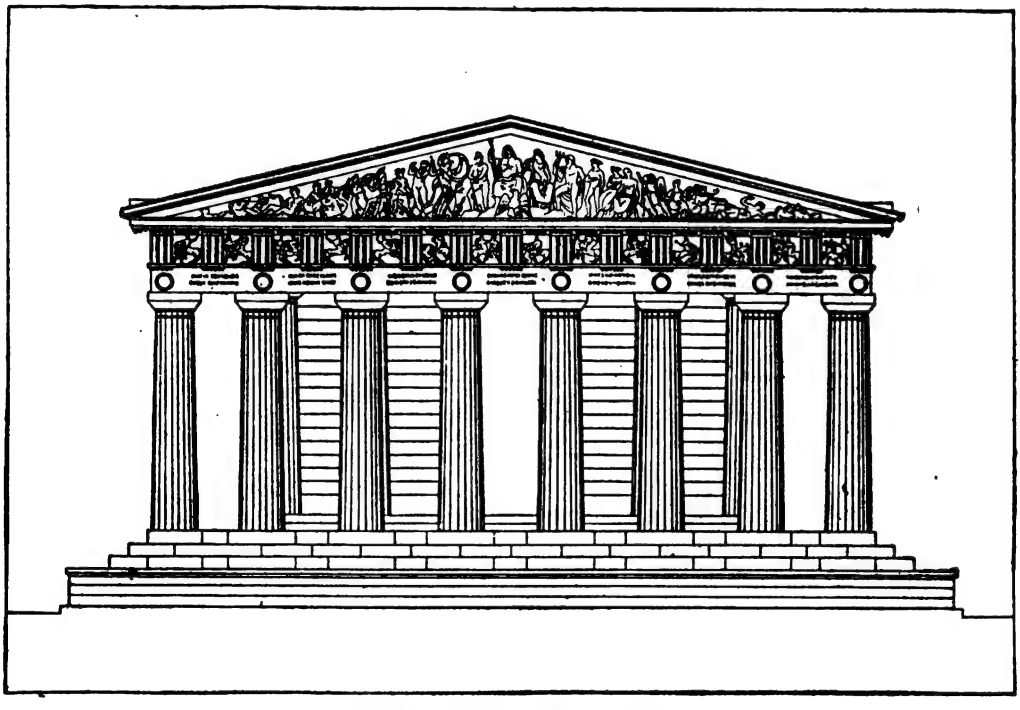
Parson Bird, characteristic bird of New Zealand (*Prosthemadera nova-zelandica*); has glossy black coat and a tuft of white feathers on either side of the throat suggesting the garb of a clergyman.

Par'sons, or Persons, Robert, 1546–1610; English ecclesiastic and author; b. Nether Stowey, Somersetshire; educated at St. Mary's Hall and Balliol College, Oxford; graduated, 1568, and became dean; left Oxford, 1574, in consequence of his conversion to Roman Catholicism; studied medicine and law; entered Society of Jesuits at Rome, 1575; took orders as a priest; was sent by Pope Gregory XIII to England, 1580, to attempt the conversion of that kingdom to Roman Catholicism; became the object of energetic measures on the part of the English Govt.; escaped to the Continent, 1581; opened a seminary for English youth at Eu in Normandy, 1584; became rector of the English college at Rome and provincial of the English missions; communicated with James VI of Scotland in behalf of his mother, Mary, Queen of Scots, then awaiting execution, and visited in her behalf the courts of France, Spain, and Portugal; founded seminaries for English Roman Catholics at Valladolid, San Lucar, Seville, and Lisbon, and at St.-Omer, France, 1593; became a second time rector of the English College at Rome, 1598–1610, and resisted all attempts to make him a cardinal after the death of Cardinal Allen. He was the author of several treatises in favor of the doctrines of the Church of Rome, which appeared in London under assumed names, among which were "A Brief Discourse," 1584; "The Christian Directory," 1583–91; "A Conference about the Next Succession to the Crown of England," 1594 and "A Treatise of the Three Conversions of England," 1603–4. For issuing the first and the third of these works the printers were hanged and quartered, and it was made high treason to own a copy of the latter book, which advocated the claims of the Infanta of Spain to the English throne.

Parson's Cause, The, lawsuit tried in Hanover Co., Va., December, 1759, in which Patrick Henry gained his reputation as an orator. The salaries of ministers of the Established Church has been computed in tobacco, the local currency. In 1748 this salary, with the approval of the crown, was fixed at 16,000 lb. In 1755, tobacco being high, the Assembly commuted the salaries at twopence per pound in colonial currency. In 1758 the crown disallowed the commutation act, and the clergy began to sue the vestries for the difference between the market price of the tobacco and the money paid them. Patrick Henry appeared for the defense in an action brought by Rev. James Maury, 1763. While the court had to decide that the act of the Assembly was void, since it had not received the approval of the crown, Henry's speech so influenced the jury that they gave Maury a verdict for only one penny. No record of this speech declaring that Virginia could legislate as to her own affairs and protesting against the crown's intermeddling has come down to us, but it had a patent influence in the pre-Revolutionary struggle.

Parthenogen'esis (Greek, "virgin," production), that type of reproduction where unfertilized eggs develop into adults. It occurs in various groups of invertebrates, especially in land and fresh-water forms which are exposed to seasonal changes. Instances are most numerous among the lower Crustacea and insects. In some Crustacea it is almost the rule. Parthenogenesis may occur occasionally in forms like butterflies and silkworms, when sexual reproduction is the rule, or it may occur as a normal condition in the production of one sex, as among the honeybees, where the drones are developed from nonfertilized eggs, the workers and queens being developed from impregnated ova. Among the plant lice (*Aphides*) parthenogenetic reproduction prevails during the warmer months, the females producing eggs which develop, without fertilization, inside the mother, the young being born alive. In the autumn true males and females appear, and fertilized eggs are laid which carry the species through the winter months. Here the normal females differ from the parthenogenetic ones, since the latter possess wings and lack those organs necessary for copulation.

Par'thenon, temple of Athena Parthenos at Athens; built by Pericles abt. 438 B.C.; architects, Ictinus and Callicrates; part of sculptured decorations thought to have been from the hand of Phidias. It stands on the Acropolis; is of the Doric order, built of Pentelic marble; 228 ft. long and 101 ft. wide. There were 46 columns in its peristyle, 8 at each end and 17 on each side, reckoning the corner columns twice. It stood almost entire until 1687, when a large part was destroyed by the explosion of gunpowder stored in it by the Turks. It is regarded as the finest production of Greek architecture. The statues from the pediments so far as preserved, many of the



PARTHENON (RECONSTRUCTED).

metopes, and a large part of the frieze on the outer wall of the cella are among the chief treasures of the British Museum.

Par'thia, ancient territory of W. Asia; SE. of the Caspian Sea, corresponding nearly to the modern Persian province of Khorassan; was wholly mountainous and inhabited by a rough, wild, and warlike people of Scythian descent, famous for their horsemanship and skill with the bow. They belonged successively to the Assyrian, Persian, Macedonian, and Syrian empires, but, 250 B.C., they established an independent kingdom under Arsaces, whose dynasty, the Arsacidæ, ruled till 226 A.D. and formed a vast empire, extending from the Euphrates to the Indus. The Romans attacked them several times, but without success; but Artabanus IV was killed, 226 A.D., in a rebellion, and the dynasty of the Arsacidæ was followed by that of the Sassanidæ, a Persian family. The Persian influence was the ruling one in Asia till the Mohammedan conquest, 651 A.D.

Par'ticle, name of rather indefinite application, given primarily to the uninflected words in Greek and Latin, such as conjunctions, adverbs, and prepositions. The word is now used for the less important words in a sentence, which may be often omitted without injury to the sense.

Part'nership, relation which subsists between persons carrying on a business in common with a view to profit. Partners generally own the property and profits jointly; but one or more may own the property exclusively, while the joint ownership applies to the profits alone. A partnership may own all kinds of property, including real estate, when it is bought with partnership funds, for partnership purposes, and is then liable, like personal property, for partnership debts, until a balance is ascertained and divided among the partners; then, however, it regains its character as real estate in respect to all the incidents of dower and the like. A partnership may be formed by a written instrument, or by oral agreement merely. The agreement usually is to enter into a certain business and share the profits and losses thereof. Sometimes persons may be partners as to third persons who deal with the firm, while they are not partners as between themselves. Whether one is a partner in regard to the rights and obligations of the members of the firm among themselves depends on the agreements that have been made; but whatever these agreements are, he may be a partner as to third persons if he has been held out to the world as a partner, or if he actually participates in the profits. The rule is nearly universal, that one who participates in the profits as such is liable for the losses. At the foundation of the whole law of partnership is the doctrine that each partner and the whole of his property is liable for the whole of the partnership debts. This rule is universal except in the case of the modern statutory partnerships. Each partner has full power and authority to act for the others and represent the whole firm in matters appertaining to the partnership, though either partner's powers may be restrained by agreement, and all persons to whom this agreement is communicated are bound by it.

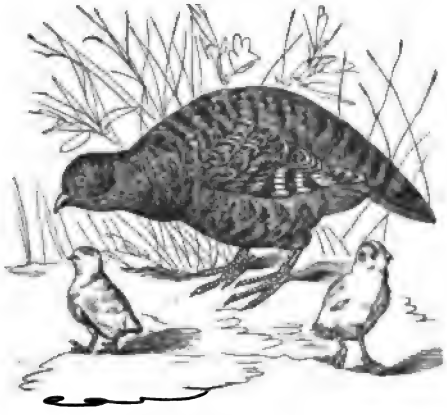
The power of the majority of the partners to bind a minority seems to be confined to what are called the domestic affairs of the firm, as the hiring a store, keeping clerks, and the like; but a partner may protect himself from liability by giving notice to outside parties concerned in an inchoate and incomplete transaction with his firm that he dissents therefrom and will not be bound by the action of the firm. The dissolution of a partnership does not affect its existing debts as the liability of the partners for them, but it prevents the contracting of any new debt by the firm. A partnership may be dissolved by the agreement of the parties, by the operation of law, or by the decree of a court. If a partnership is dissolved by the death of a partner, the property and business pass to the survivor or survivors, but only to settle the business and close the affairs of the partnership as soon as can properly be done; and when the settlement is made, the share due to his estate must be paid over to the representatives of the deceased. Disputes about partnership affairs between partners must be litigated before courts of equity, and not in courts of law. As to the rights of creditors, while it is settled that the creditors of the firm have an exclusive right to the property of the firm, the courts are at variance on the question whether the private creditors of the partners have an equally exclusive right to the private property of the indebted partners.

In LIMITED or SPECIAL PARTNERSHIP, a certain amount is actually contributed to the capital of the firm by one or more members, the liability of such member or members for the firm debts being limited to the amount so contributed. Such partnerships were unknown to the common law, and the limitation of liability is secured in the U. S. only by strict compliance with the requirements of the statutes on the subject.

Par'ton, James, 1822–91; American author; b. Canterbury, England; taken to New York City in early youth; teacher there and in Philadelphia; assistant editor *The Home Journal*; married Sarah Payson Willis ("Fanny Fern"), sister of Nathaniel P. Willis, 1856; prolific author and a lecturer on literary, social, and political topics; works include "Biographies" of Horace Greeley, Aaron Burr, Andrew Jackson, Benjamin Franklin, Thomas Jefferson, and Voltaire; "Humorous Poetry of the English Language," "People's Book of Biography," "Famous Americans of Recent Times," "Triumphs of Enterprise," "Caricature in all Times and Lands," "Captains of Industry."

Part Own'ership, species of title to personal property employed mainly in the case of shipping; distinguished from joint tenancy by the absence of survivorship, from tenancy in common by the absence of the right to force a severance of the various owners' interests, and from partnership title by the fact that each person interested owns an undivided share of a chattel instead of a share in the business.

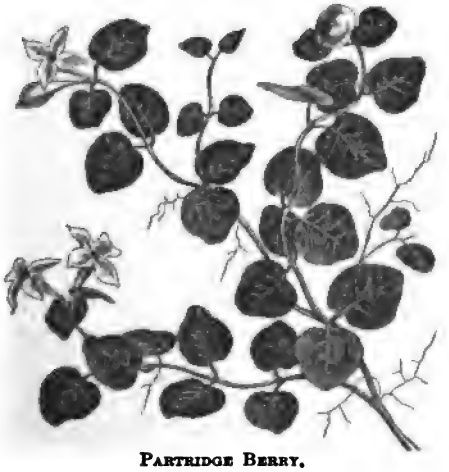
Par'tridge, any one of various medium-sized game birds of the grouse family (*Tetraonidæ*); in England, the *Perdix cinerea*, a bird about a foot long, of a delicate mottled gray; in the N. parts of the U. S., the ruffed grouse (*Bonasa umbellus*); in the S. part, the pheasant;



COMMON PARTRIDGE.

term also bestowed on the quail, or bobwhite (*Colinus virginianus*). Sportsmen in Australia have dubbed the true quail (*Turnix*) partridge, and in S. America given the name to some of the larger tinamous, birds of a totally different group.

Partridge Ber'ry, common name of a trailing evergreen herb, *Mitchella repens*, belonging to the madder family; found in the U. S., Canada, Mexico, and some parts of S. America;



PARTRIDGE BERRY.

bears a red fruit, about the size of a whortleberry, which remains on the stem all winter. The wintergreen is sometimes, but incorrectly, called partridge berry or checker berry.

Partridge Wood, name applied in commerce and the arts to several handsome tropical woods used for veneering and for making small ornamental wares; more generally given to the wood of *Andira inermis*, a leguminous tree of the W. Indies and S. America; wood is hard, and in Brazil used in shipbuilding.

Par'ty Wall, in law, a dividing wall between lands of different proprietors, used in common for the support of structures on both sides. Where such a wall exists, partly on the land of each owner, each has an easement in the land of the other while it stands, and this accompanies the title in sales and descent. Repairs to party walls are to be borne equally.

Parvati (pär'vä-tē), female divinity of the ancient Hindu pantheon, consort of Siva.

Pascal (päs-kăl'), **Blaise,** 1623–62; French mathematician and philosopher; b. Clermont-Ferrand; at age of twelve rediscovered by himself elementary geometry, which he had not been allowed to study; at seventeen his treatise on "Conic Sections" made him celebrated; at nineteen made a calculating machine; followed up these mathematic studies with valuable investigations in physics, on the weight of the atmosphere, etc. When little over twenty he came under the influence of the Jansenist writers of Port-Royal, and gave himself up to fervent piety. Though he returned from time to time to mathematical studies, developing the calculus of probabilities, and giving a solution of the problem of the cycloid, his main interest was henceforth fixed on questions of morals, philosophy, and religion. He spent his last years, broken in health and wracked with pain, in the practice of severe asceticism. His greatest works are "Provincial Letters" and "Thoughts."

Paschal (păs'kăl), name of several popes and antipopes: PASCHAL I, d. 824; pope; b. Rome; succeeded Stephen V, 817; crowned Emperor Lothaire, 823. PASCHAL I, d. 694; antipope; Roman archdeacon; elected by faction of Roman people, and Theodorus II elected by another faction, 687; Sergius I declared true successor of deceased pope (Conon); Paschal imprisoned as a magician. PASCHAL II (RAINIERI), d. 1118; pope; b. Bleda, Italy; succeeded Urban II, 1099; involved in long contests with Henry IV and Henry V of Germany concerning investitures; imprisoned by Henry V; compromised similar troubles with Henry I of England; had concessions condemned by council he convoked; succeeded by Gelasius II. PASCHAL III (GUIDO DI CREMA), d. 1168; antipope; b. Lombardy; declared pope by Frederick Barbarossa, 1164, in opposition to Alexander III.

Pasha, Pacha (pä-shä') or **Bashaw',** honorary Turkish title; originally given to princes of the blood, and afterwards to persons honored with high official functions. Pashas are of three classes, the symbol of their rank being formerly one, two, or three horsetails, which were carried before them on state occasions. A district or province governed by a pasha is called a pashalik.

Pasiphaë (pă-sĭf'ă-ē), in Grecian mythology, a daughter of Helius, wife of Minos, King of Crete. Minos, when seeking to become king, asserted that the gods would grant whatever

request he might make. In proof thereof he prayed to Poseidon to send him a bull from the sea for the purpose of sacrificing him to Poseidon. Poseidon sent the bull; the astonished Cretans made Minos king; but Minos offered in sacrifice a less magnificent animal from his own herd. Poseidon made the bull insane and caused Queen Pasiphaë to fall in love with him, the result being that she became the mother of the Minotaur.

Paso del Norte (pä'sō dĕl nōr'tā). See EL PASO, TEXAS.

Paso del Norte. See JUAREZ.

Pasque (păsk) **Flow'er,** name given to a ranunculaceous herb of Europe and Asia (*Anemone pulsatilla*), and also to some other species of *Pulsatilla*; are spring-blooming plants, with poisonous and medicinal qualities. See ANEMONE.

Pasquinade (păs-kwĭn-ād'), anonymous attack, often in verse, and of bitter, caustic, and witty character; name derived from Antonio Pasquino, a cobbler, who lived at Rome toward the close of the fifteenth century, and was famous for his sharp personal sarcasms. After his death it became customary to post up pasquinades on a broken statue dug up near where he had lived. The torso was, and is to this day, called by his name. Most popular topic for pasquinades has been the Roman clergy and the public officers.

Passa'ic (formerly ACQUACKANONK), in Passaic Co., N. J.; on the Passaic River; 5 m. SE. of Paterson; has waterworks supplied from above the noted Passaic Falls at Paterson; industrial establishments include dye and print works, rubber works, woolen factories, worsted mill, satinet mill, bleacheries, planing mills, brickyards, extensive vineyards, large winery, and chemical works. Pop. (census of 1910) 54,773.

Passaic Riv'er, stream rising in Morris Co., N. J., and after a tortuous course of 100 m. flows into Newark Bay, 3 m. from Newark; navigable for 13 m.; at Paterson has a remarkable fall of 72 ft., affording valuable water-power.

Passamaquod'dies. See PENOBSCOTS.

Passamaquod'dy Bay, inlet of the Atlantic, forming part of the boundary between Maine and New Brunswick; abounds in good and deep harbors; picturesque islands are numerous and fisheries important; tides average 25 ft. in rise; receives the noble estuary of the St. Croix.

Passavant (pä-sä-vän'), **William Alfred,** 1821–94; American philanthropist; b. Zelienople, Butler Co., Pa.; pastor at Baltimore, Md., 1842–44, and Pittsburg, Pa., 1844–55; life later devoted to service of various benevolent institutions, founded by his instrumentality; founded successively hospitals in Pittsburg, Milwaukee, Chicago, and Jacksonville, Ill., and orphanages at Zelienople and Rochester, Pa., and Mt. Vernon, N. Y., besides being closely identified with the beginning of the orphanages at Germantown, Pa., and Boston, Mass.; with A. Louis Thiel, founded, 1870, Thiel College, Greenville, Pa.; 1891, established the Lutheran Theological Seminary in Chicago. He was the first to introduce the order of deaconesses into the U. S. He was founder of the Pittsburg Synod, and chief organizer of the missionary work in the Americanized portion of the Lutheran Church; was one of the founders of the Emigrant House and Mission in New York City, and of the General Council of the Lutheran Church in America.

Pas'senger Pi'geon, wild pigeon (*Ectopistes migratorius*) of Central and E. N. America, deriving its name from its long migrations in search of food; body about 8 in. in length; tail the same length; in greater part of its natural habitat the bird has been practically exterminated.

Passeres (păs'sē-rēz), group of birds containing the typical song birds, or perching birds; group includes something like 5,000 species.

Pas'sion Flow'er, name in its widest sense applicable to nearly all the species of *Passiflora*, the principal genus and type of the family *Passifloraceæ*, mostly climbing plants of tropical America, and a few other ornamental species in common cultivation; name derived from the fancied resemblance of the various parts of the flower to the means of Christ's passion and death; the nails, the crown of thorns, the five wounds, and even the hammer and the cross itself, having been identified in the blossom.

Pas'sionists, Congrega'tion of the, religious congregation in the Roman Catholic Church, founded at Ovado, Piedmont, 1720, by Paul of the Cross (1694–1775); confirmed by Benedict XIV, 1741 and 1746, and by Pius VI, 1775; congregation of women added before the founder's death; Passionists numerous in the U. S. and Europe; devote themselves to local missions and preaching.

Pas'sion Plays. See MIRACLES AND MORALITIES; OBERAMMERGAU.

Pas'siontide, name given to the last two weeks of Lent, the first week of which is Passion Week and the last Holy Week.

Pass'over, Hebrew festival in commemoration of the Israelites remaining intact on the night of the destruction of the first-born in Egypt, immediately preceding the Exodus (Ex. xii). Originally it was observed by sacrificing passover lambs toward the evening of the 14th of the first spring month, and eating them on the following night, as well as by excluding all leaven from the meals of that evening and the following seven days, the first and last of which were observed as holy. The sacrifice ceased with the final destruction of the temple in Jerusalem, but the other observances have remained in force, an eighth day having been added to the festival out of Palestine, and with the second made a holiday.

Pass'port, document given by the authorized officer of a state, which permits a person or persons therein named, and particularly described to travel either generally, or through a

specified country or in certain routes. Passports have long been used by civilized governments. They are not employed within the territory of England or the U. S.; but the governments of those countries give them to their citizens who purpose to travel abroad.

Pasta (päs'tä), **Giuditta Nigri**, 1798–1865; Italian opera singer; b. Milan of Jewish parentage; made her début, 1815, in Leghorn and Parma; sang, 1816, in Paris and London; in Venice and Milan, 1819; great career began at Verona, 1822. In the following years sang with great success in Paris and London, and subsequently in Naples, where Pacini wrote his "Niobe" for her, and in Milan, where Bellini composed his "Norma" and "La Sonnambula" for her.

Pas'tel, colored crayon made of pipe clay or other opaque material mixed with gum water and some pigment. Pastel pictures are executed on roughened paper and parchment, and the color is generally worked on with the finger.

Pasteur (päs-tėr'), **Louis**, 1822–95; French chemist and biologist; b. Dôle, Jura; appointed Prof. of Chemistry, 1848, at Dijon; 1849 at Strassburg; 1854 at Lille; and, 1857, at Paris, where he was director of the École Normale; in 1863 Prof. of Geology, Physics, and Chemistry at the École des Beaux-Arts, and of Chemistry at the Sorbonne, 1867. In 1884 he laid before the Institute a method of curing or preventing hydrophobia by inoculating with the poisonous virus in an attenuated form, and the commission of investigation declared the method efficacious. Several of his chemical works received prizes, and, 1874, the French Govt. gave him a pension of 20,000 fr., increasing it the following year, in consideration of his services to science and industry.

Pas'tor, genus of starlings, having representatives in Europe and the Old World tropical regions; useful as destroyers of insects, but sometimes destructive to small fruits.

Pas'toral Po'etry, poetry which affects the matter or manner of rustic life, not for the purposes of accurate, even though sympathetic, description, but as a purely artistic device for conveying the interests and emotions of the poet himself, and of the society, not rural, in which he lives. The pastoral forms are many —idyls, eclogues, plays, or romances, in which the leading rôles are given to shepherds, shepherdesses, or other country folk, all bearing this generic name. Contradictory though it appear at first sight, the pastoral has historically been one of the most elaborate and artificial of all literary varieties, and has generally been produced only in societies that had reached an advanced stage of refinement. See POETRY.

Patago'nia, name originally applied to all the S. part of S. America, with a vague limit N., about lat. 38° or 39° S.; still used for convenience, but generally restricted to the portion E. of the Andes and S. of the Rio Negro, forming the Argentine territories of Neuquen, Rio Negro, Chubut, and Santa Cruz, with a small strip at the S. end belonging to Chile. Settlements are springing up near the coast; interior inhabited only by wandering Indians, of several tribes, classed together as Patagonians, but called Tehuelches or S. People by the Araucanians; number abt. 20,000; most are more or less friendly to the whites. Patagonia was nominally attached to the viceroyalty of La Plata or Buenos Aires, and the whole of it was claimed, after the revolution, by the Argentine Confederation. In 1881 all the strip W. of the summits of the Andes, together with the borders of the Strait of Magellan, was definitely given up to Chile; it now constitutes the province of Llanquihue and the territory of Magallanes; area, 83,115 sq. m., and an estimated pop. of abt. 85,000. The other portion, which is now incorporated into Argentina, and is divided into five territories, has an area of 268,000 sq. m. and a pop. of abt. 100,000.

Pataps'co Riv'er, stream rising in Carroll Co., Md.; flows 80 m. S. and SE.; and enters Chesapeake Bay by an estuary, on which stands Baltimore; upper course very rapid, affording much water power; estuary admits first-class ships.

Patchouli, or **Patchouly** (pă-chō'lī), odoriferous labiate plant (*Pogostemon patchouli*) of S. Asia; extensively used in perfumery and against the ravages of clothes moths; India

PATCHOULI PLANT.

ink and India shawls derive their peculiar odor from this plant; Orientals use it for stuffing mattresses and to ward off contagion and vermin; also mix it with tobacco for smoking; grows to a height of 2 or 3 ft., bears spikes of densely whorled small flowers.

Pâté de Foie Gras (pă-tā' dė fwä grä), literally, a "pie of fat liver," made generally of the liver of the goose, and in Nérac, France, of the liver of the musk duck. Strassburg and Toulouse are famous for goose liver pastry terrines. The method of producing the abnormally large liver is to take a young bird in autumn, confine it in a cage which permits

but little movement, generally in a dark place, and feed it with beans, or more commonly with maize. Under this treatment the liver swells, and attains a weight of from 1 to 2 lb. The cook seasons and spices it, adds truffles and other ingredients, bakes the contents of the terrine, and pours over the mass a layer of fresh hog's lard to protect it from the air.

Patel'la, or Knee'pan, bone formed in the tendon of the quadriceps extensor muscle of the thigh, just anterior to the knee joint; does not begin to form until the child is from three to six years of age.

Pat'ents, letters issued by a government granting to inventors the exclusive use of their inventions for definite periods. The practice of thus inciting inventors to improvements in arts and industries is of remote origin. So far as concerns modern jurisprudence, however, it was first adopted by the English, and the common law gave to the king the power of granting such privileges. The earlier patents were based upon the condition that the invention be worked within the realm, this working being the consideration paid by the patentee for the protection afforded. In some cases a tax or a portion of the profits was paid to the crown; the former is still a feature of the British patent laws, from which it has passed to those of France and Belgium; but the secret of the invention was not required to be revealed until after the expiration of the patent. The patent system of Great Britain was the parent stem from which all others have sprung.

The first U. S. Patent Law was the Act of 1790. It provided for the granting of letters patent on "any useful art, manufacture, engine, machine, or device, or any improvement therein, not before known or used." The petition for the grant was to the Secretary of State, the Secretary of War, and the Attorney-general. The patent was issued on the approval of those officials or any two of them. The description of the invention was certified by the Attorney-general, and the President caused the great seal of the U. S. to be affixed on the issue of the patent. The term of the patent was for "any term not exceeding fourteen years" in the discretion of the aforenamed members of the Cabinet. In 1793 a new statute was passed, repealing that of 1790, although retaining much of its substance. This act of 1793 restricted the grant of patents to citizens of the U. S.; provided that the petition should be to the Secretary of State; that owners of patents from any state should be incapable of holding a patent from the U. S. except on condition of relinquishing the state patent; that interfering applications should be decided by arbitrators; that patents obtained "surreptitiously or upon false suggestion" could be declared void on motion made and proof produced before the U. S. district court of the district wherein the patentee resided, if made within three years from the date of the patent.

In 1833 all previous statutes on this subject were repealed. The Act of 1833 introduced many changes. It attached to the department of state "an office to be denominated the Patent Office, the chief officer of which shall be called the Commissioner of Patents." This law was the first to institute the system of preliminary examinations to determine the patentability of inventions before issue of patents thereon, and from the single examiner appointed under it has come the staff of examiners, and the complicated system of examinations, appeals, etc., that now obtains. This law provided also for the filing of caveats on partially perfected inventions and confirmed the right of reissue. From 1836 to 1873 the patent laws were frequently amended. In the latter year they were codified in title 60, chapter i, of the U. S. Revised Statutes, in which form, with a few amendments, they still remain. Brief abstracts, together with decisions of the courts in patent cases, decisions of the commissioner, etc., are published weekly in the official gazette. Patents are obtained by applications in the form of petitions to the Commissioner of Patents, accompanied by a description, including drawings. Models may be demanded by the Patent Office, but are not often required. When the invention is of a composition of matter, specimens may in like manner be required. On receiving an application for a patent the commissioner refers it to the proper primary examiner for his examination into the state of the art to which the invention appertains, and for his report of the result of his examination to the commissioner.

If no reason is found against granting the patent, it is allowed and issued. When an application is made for a patent which in the opinion of the commissioner would interfere with any pending application or with any existing patent, notice is given to the parties interested, and an opportunity granted to them to show by evidence which was prior in date of invention; and the patent will be issued to the one proved to be the first. The term for which patents for inventions issue in the U. S. is seventeen years. If an inventor, after conceiving the outlines of his invention, desires further time to mature the same, and in the meantime to guard against any other patent being granted for the invention, he may do so by filing in the patent office a caveat, setting forth the design and distinguishing characteristics of his invention and praying protection of his right until he shall have matured his invention. Such caveat will be preserved in secrecy by the Commissioner of Patents, and the effect of it will be to entitle the caveator for one year to notice from the commissioner of any application which may be made for a patent which would in any way interfere with his right. After receiving such notice, if any be given, the caveator will be allowed three months in which to file a complete application.

According to the report of the Commissioner of Patents, the number of patents issued by different countries from the earliest records to December 3, 1907, was as follows: U. S., 885,635; France, 395,272; Great Britain, 383,117; Germany, 212,080; Belgium, 211,261; Canada, 112,657. In 1911 the U. S. issued 34,084 patents.

Pa'ter, Walter Horatio, 1839–94; English author; b. London; critic of art and literature; master of a very graceful prose style; works include "The Renaissance," "Marius the Epicurean," "Imaginary Portraits," and "Appreciations."

Pater Nos'ter (Latin, "Our Father"), name given by Roman Catholics to the Lord's Prayer. In the ancient Church it was regarded as so sacred that its formula was kept a secret from the uninitiated.

Pat'erson, capital of Passaic Co., N. J.; on the Passaic; 15¾ m. NW. of New York City. The river, which affords exceptional power for manufacturing, runs through the city, and Passaic Falls, 72 ft. high, are within its limits. In 1909 there were 702 "factory-system" plants, with 32,004 wage earners, and products valued at $69,584,000. The principal industries are the manufacture of silk and silk goods, foundry and machine-shop products, malt liquors, dyeing and finishing textiles, slaughtering and meat packing. The city was founded, 1791, on a plan prepared by Alexander Hamilton to make it a great national manufacturing city, and named after Gov. William Paterson, of New Jersey. Between February, 1902, and October 11, 1903, it was visited by four great catastrophes—fire, tornado, and two floods. Pop. (1910) 125,600.

Pathol'ogy, branch of medical science which treats of disease, and especially of the changes produced in the tissues of the body by injury, the invasion of germs, etc. As these unhealthy conditions affect the minute cells of which all living tissues are made, a microscopic examination is usually made of a thin slice of the diseased tissue. In this way the microscope has revolutionized the diagnosis and treatment of disease. Lack of nourishment or old age will produce atrophy or wasting of the cells of a limb or organ, which may even go on to necrosis or death. An injury to healthy living tissue is followed by inflammation, which naturally tends to limit and repair the injury. If the injury is severe scar tissue replaces the injured cells and the hard connective-tissue cells which compose the scar may entirely replace the natural tissues. This change, known as sclerosis, causes serious diseases; in the kidneys it produces Bright's disease, in the spine locomotor ataxia, in the arteries a general stiffening which tends to the bursting of a vessel or apoplexy. The poisons produced in the body of bacteria, long-continued fevers, or other weakening causes lead to various degenerations, such as fatty degeneration, in which droplets of fat are found in the normal cells. In the heart especially such fatty degeneration is serious.

Pathology, Veg'etable, department of botany which deals with the diseased conditions of plants; is coextensive with physiology, which deals with plants and their organs in their normal, active state.

Path'ros (Egyptian, the SOUTH LAND), Hebrew name of upper Egypt as distinguished from the Delta region, which was usually known as Mizraim (Isa. xi, 11; Jer. xliv, 1, 15).

Pat'more, Coventry Kearsey Dighton, 1823–96; English poet; b. Woodford, Essex; was assistant librarian in the British Museum, 1846–68; author of "Poems," "Tamerton Church Tower," "The Angel in the House."

Pat'mos (modern, PATMO, or PATINO), island of Turkey in the Ægean Sea; one of the Sporades; was a place of banishment under the Romans. St. John was confined here under Domitian, and released on the tyrant's death (96). Here is the forestlike monastery of St. John the Theologian, erected 1088. The inhabitants, numbering abt. 4,000, are industrious Greeks.

Pat'na, city of Bengal, British India; on the Ganges; 285 m. NW. of Calcutta; has manufactories of shawls, tablecloths, and lacquered ware; center of opium trade; chief seat of Mohammedanism in India. Pop. (1901) 134,785.

Pat'on, Sir Joseph Noel, 1821–1901; Scottish historical painter; b. Dunfermline; entered the schools of the Royal Academy, London, when twenty; his pictures "Christ Bearing the Cross" and "The Reconciliation of Oberon and Titania" won for him a prize of £300 at the Westminster Hall competition, 1847. He was elected to the Royal Scottish Academy, 1850; knighted, 1867. He was a sculptor of ability, wrote on archæology, and published two volumes of poems.

Patriarch (pā'trĭ-ärk), title applied to the heads of generations mentioned in Scripture from Adam to Jacob. After the destruction of Jerusalem it was the title of the chief religious rulers of the Jews in Asia, and in early Christian times of the bishops of Rome, Constantinople, Alexandria, Antioch, and Jerusalem. The last four are still patriarchal sees both of the Orthodox Greek and Latin churches. Certain other bishops obtained the title later; and various Christian sects of the East have patriarchs.

Patrician (pă-trĭsh'ăn), member and descendant, by blood or adoption, of any of the original houses of which the *populus Romanus* was wholly composed until the establishment of the plebeian order. The patricians were at first divided into three tribes, each tribe consisting of ten *curiæ*, and each curia of ten *gentes*, or in regard to representation and war of ten *deuriæ*. The *gens* sent its leader to the Senate. To distinguish the old Senators from the new, when Tarquinus Priscus admitted the Etruscan tribe of Luceres to equal political privileges with the Ramnenses and Titienses, the former were called *patres majorum gentium* and the latter *patres minorum gentium*. At the end of the republic the number of patrician families had diminished to about fifty. The plebeians, in a struggle of centuries, had conquered all their political rights, and a new aristocracy had arisen, founded on wealth and on the holding of the offices of consul, prætor, and curule ædile. Constantine made the title a personal instead of a hereditary distinction. After the loss of Italy, the Romans conferred this title on their rulers and protectors. Dur-

ing the Middle Ages families entitled patriciae sprang up in many of the cities, and in some the title is still used.

Pat'rick, Saint, abt. 372–493; b., according to his "Confession," Bannaven Taberniae, supposed to be Kirkpatrick, near Glasgow, Scotland; apostle and patron saint of Ireland; baptismal name Succath ("brave in battle"); at age of sixteen was carried captive to Ireland by a band of marauders; escaped back to Scotland; carried off second time; again escaping, resolved to become a missionary to the Irish; consecrated bishop and entered Ireland abt. 432. Before his death he had converted almost the whole island to the faith. **Day, March 17th.**

Patriot'ic Soci'eties in the Unit'ed States. The following are among the more important societies formed to perpetuate the memory of events or periods in the history of the U. S.:

THE AMERICAN LEGION, an organization of members of the army, navy, and allied services who were actively engaged in the World War; founded in 1919.

THE SOCIETY OF THE CINCINNATI was founded in Newburg, N. Y., May 13,1873, by American and foreign officers who served for three years in the Continental army. Membership descends to the eldest lineal male descendant, and, in failure of a direct male descendant, to male descendants through intervening female descendants. Membership (1914) 1,007.

THE SOCIETY OF THE WAR OF 1812 was instituted in New York City, January 30, 1826. It admits to hereditary membership descendants of commissioned officers who actually served in the War of 1812. It absorbed the Veteran Corps of Artillery in 1848, and in 1892 adopted its present name. Membership, 100.

THE AZTEC CLUB of 1847 was founded in the city of Mexico, October 13, 1847. It admits to membership as primary members officers who participated in the war, and, as associate members, sons or blood relatives. Membership, 218.

THE MILITARY ORDER OF THE LOYAL LEGION was organized in Philadelphia, Pa., April 15, 1865. Its membership is divided into companions of the first class, consisting of officers who participated in the Civil War, and companions of the second class, consisting of the eldest sons of original companions. Membership (1917) 6,598.

THE GRAND ARMY OF THE REPUBLIC was organized in Decatur, Ill., April 6, 1866. It admits to membership any soldier or sailor of the U. S. army, navy, or marine corps who served between April 12, 1861, and April 9, 1865, and who was honorably discharged therefrom after such service, and of such state regiments as were called into active service and subject to the orders of U. S. general officers between the dates mentioned. Membership (1918) 120,916.

THE SOCIETY OF THE SONS OF THE AMERICAN REVOLUTION, organized in San Francisco, Cal., October 22, 1875, admits to membership any lineal male descendant of an ancestor who was at all times unfailing in his loyalty to, and rendered actual service in, the cause of American independence. Membership about 15,000.

THE SOCIETY OF THE SONS OF THE REVOLUTION was organized in New York City, February 22, 1876. Membership is permitted to any male person descended from one who as a military, naval, or marine officer, soldier, sailor, or marine, was in actual service under the authority of any of the thirteen colonies or states, or of the Continental Congress, and always loyal to such authority. Membership about 8,000.

THE SONS OF VETERANS, U. S. A., was organized in Philadelphia, Pa., September 29, 1879. It admits to membership any lineal descendant more than eighteen years old of any honorably discharged Union soldier, sailor, or marine, who served in the Civil War. Membership about 56,000.

THE WOMAN'S RELIEF CORPS, which is an auxiliary to the Grand Army of the Republic, was organized in July, 1883. It admits to membership mothers, wives, daughters, and sisters of Union soldiers. Membership, 161,761.

THE UNION VETERAN LEGION was organized in Pittsburgh in March, 1884. It admits to membership any officer, soldier, sailor, or marine of the Union army, navy, or marine corps, during the Civil War, who volunteered prior to July 1, 1863, for a term of three years, and was honorably discharged, for any cause, after a service of at least two continuous years, or was at any time discharged by reason of wounds received in line of duty; also those who volunteered for a term of two years prior to July 22, 1861. Membership over 20,000.

THE HOLLAND SOCIETY was founded in New York City, April 6, 1885. It admits to membership male descendants in the direct male line of a Dutchman resident in America before 1675. Membership, 843.

THE UNION VETERANS' UNION was founded in Washington, D. C., in 1886. It admits to membership veterans who have served honorably in the army, navy, or marine corps of the U. S. between April 12, 1861, and April 30, 1865; have participated in one or more engagements or battles, and have received an honorable discharge. Membership, 71,000.

THE UNITED CONFEDERATE VETERANS was organized in New Orleans, La., June 10, 1889. It admits to membership any surviving soldier or sailor who served in the Confederate service during the Civil War. Membership about 50,000.

THE NATIONAL SOCIETY OF COLONIAL DAMES OF AMERICA, organized in New York City, May 23, 1890, has among its objects to collect manuscripts, traditions, relics, and mementoes of bygone days, for preservation, and to commemorate the success of the American Revolution. It admits to membership (on invitation only) women who are legitimately descended in their own persons from some ancestor of worthy life who came to reside in an American colony before 1776. This society has chapters in the cities of New York, Baltimore, Philadelphia, and Washington. Membership (1918), 620.

THE SOCIETY OF THE DAUGHTERS OF THE AMERICAN REVOLUTION was organized in Washington, D. C., October 11, 1890. Any woman who is of the age of eighteen years, and who is descended from a man or woman who with unfailing loyalty rendered material aid to the

BADGES AND ROSETTES OF PATRIOTIC SOCIETIES.

1. Sons of the American Revolution
2. Society of the Cincinnati
3. Sons of the Revolution
4. Society of Colonial Wars
5. The Society of the War of 1812
6. General Society of the War of 1812
7. The National Society of the Colonial Dames of America
8. Aztec Club of 1847
9. Society of the Colonial Dames of America
10. Daughters of the Revolution
11. Naval Order of the United States
12. Daughters of the American Revolution

cause of independence, is eligible to membership. Membership, 102,312.

THE GENERAL SOCIETY OF THE WAR OF 1812 was organized in Philadelphia, Pa., January 8, 1891. Membership is open to any male person above the age of twenty-one years who participated in or who is a lineal descendant of one who served during the War of 1812. Membership, 575.

THE DAUGHTERS OF THE REVOLUTION was organized in New York City, August 20, 1891. It admits to membership any woman more than eighteen years old who is a lineal descendant of an ancestor who was loyal to the colonies, and was in actual service during the Revolution. Membership, 3,000.

THE NATIONAL SOCIETY OF THE COLONIAL DAMES OF AMERICA was organized in Wilmington, Del., May 19, 1892. Membership is limited to women (on invitation only) who are descended in their own right from some ancestor of worthy life who came to reside in an American colony prior to 1750. Membership (1918) 9,000.

THE SOCIETY OF COLONIAL WARS was instituted in New York City, August 18, 1892. Male descendants of the men who, in military, naval, and civil positions of high trust and responsibility, by their acts or counsel, assisted in the establishment, defense, and preservation of the American colonies, are eligible to membership. Membership about 1,000.

THE UNITED DAUGHTERS OF THE CONFEDERACY was organized in Nashville, Tenn., September 10, 1894. It admits to membership the widows, wives, mothers, sisters, and lineal female descendants of those who served honorably in the army or navy of the Confederate states, or who served in the civil service of the Confederate states, or one of the S. states, or gave personal services to the Confederate cause. Membership, 90,000.

THE SOCIETY OF MAYFLOWER DESCENDANTS was organized in New York City, December 22, 1894. It admits to membership any lineal descendant, either man or woman, more than eighteen years old, of any passenger of the voyage of the *Mayflower* which terminated at Plymouth, Mass., in December, 1620, including all signers of the compact. Membership (1918), 697.

THE MILITARY ORDER OF FOREIGN WARS was instituted in New York City, December 27, 1894, as the Military and Naval Order of the United States, but on June 21, 1895, changed its name. It admits to membership commissioned officers who participated in any of the foreign wars as veteran companions, and direct lineal descendants in the male line of the foregoing as hereditary companions. Membership, 400.

THE SOCIETY OF THE CHILDREN OF THE AMERICAN REVOLUTION was organized in Washington, D. C., April 5, 1895. Membership is extended to any boy or girl who is descended from a man or woman who with unfailing loyalty rendered material aid to the cause of independence. Membership, 5,800.

THE UNITED SONS OF CONFEDERATE VETERANS was organized in Richmond, Va., June 30, 1896. It admits to membership any male descendant more than sixteen years old of those who served in the Confederate army or navy to the end of the war, or who died a prisoner while in actual service or who were killed in battle, or who were honorably retired or discharged. Membership, 150,000.

THE SOCIETY OF AMERICAN WARS was founded in Minneapolis, Minn., January 11, 1897. It admits to membership, as companions, U. S. officers of the Mexican or the Civil War, and lineal male descendants of colonial or Continental soldiers or civil officers prior to 1783, and of U. S. officers of the War of 1812, the Mexican War, or the Civil War. Membership, 1,020.

THE SOCIETY OF THE ARMY OF SANTIAGO DE CUBA was organised in Santiago de Cuba, July 31, 1898. It admits to membership all officers and men (including acting assistant surgeons and volunteer aids) who participated worthily in the Santiago campaign at any time between June 14 and July 17, 1898. Membership about 1,190.

THE NAVAL AND MILITARY ORDER OF THE SPANISH-AMERICAN WAR was organized in New York City, February 2, 1899. It admits to membership any man who served on the active list or performed active duty as a commissioned officer, regular, or volunteer, during the war with Spain. Membership about 270.

Patripas'sians, or **Monar'chians,** Antitrinitarians of the ancient Christian Church, who either taught, or were charged with teaching, that God the Father was incarnated and suffered in the person of Jesus Christ. They denied the doctrine of Three Persons in the Godhead, teaching only three manifestations of the One Person.

Patro'clus, friend of Achilles; son of Menoëtius of Opus, brother of Peleus, the father of Achilles. Of his participation in the Trojan war, his death by the hand of Hector, and the frightful revenge which Achilles took, the "Iliad" contains a grand picture.

Pat'ronage, in ecclesiastical affairs, the right of making appointments to vacant benefices. In England it is treated exactly like any other piece of property; it may be connected with the manor, and is then called *appendant advowson,* and it may have been separated from it and belong to a person, in which case it is called *advowson in gross.* In the Protestant Episcopal Church in the U. S. the right of appointing to vacant ecclesiastical positions, such as rectorships or the position of an assistant minister, rests with the vestry as representing the congregation. Sometimes the bishop has a coördinate power with the vestry, or the right to choose one from two or more nominations.

PATRONAGE, in political affairs, is the appointment to the subordinate offices with the distribution of which certain elected or appointed public officials are vested by law; in a body, constitute what is called "the spoils system"; said to have been established in the U. S. as a feature of public office-holding by Pres. Jackson, who was credited with declaring that "to the victor belongs the spoils."

Pa'trons of Hus'bandry, secret order having for its object the mutual protection and advancement of the interests of the agricultural classes; originated by O. H. Kelley, of the U. S. Bureau of Agriculture. The first conference relative to organization was held at Washington, November 15, 1867, when "Patrons of Husbandry" was adopted as name of order and "grange" as that of its constituent bodies and place of meeting; National Grange formally organized, December 4th same year. The saving in money by combining orders and purchasing for cash, encouraging the practice of selling direct to the consumer and buying from the manufacturer, the combining of granges in one or more counties to form mutual fire relief associations—all have aided in improving the financial condition of the members; yet even greater benefits have been derived from the discussion and practice of improved methods of agriculture, the establishment of grange libraries and reading circles, and the great prominence given to educational work. Comparatively early in the history of the order the granges in several of the W. states undertook the control of the railways, elevators, and other commercial enterprises, with indifferent success for the time being; afterwards they succeeded in bringing about more favorable legislation for the agriculturist. Though now greatly decreased, the National Grange formerly had over 30,000 subordinates in forty-four states and territories.

Patronym'ic, proper name formed on the basis of a father's or ancestor's name, and indicating descent. Family names like Johnson, Williamson, Peterson, were originally patronymics attached to the Christian name of an individual for the sake of more precise distinction. The elements *Mac-* in Irish names and *Fitz-* in English names signify "son of"; similarly the Aramaic *Bar-* in names like *Bar*abbas, *Bar*timeus. Very commonly a mere suffix serves the purpose, as in the case of the Greek *-ides*, as *Peleides*, son of *Peleus*; *Philippides*, son of *Philippos*. In Teutonic the suffix *-ingas* or *-ungas* is used similarly. It survives in modern English family names and place names like *Manning, Billings, Buckingham.*

Patroons', Dutch settlers in the colony of New Netherland (afterwards New York), who on certain conditions as to colonizing enjoyed manorial rights over their lands. To obtain the privileges of a patroon it was necessary to plant a colony of fifty persons over fifteen years of age on lands selected for the purpose, and within four years after notice was given of intent to colonize. The rights of these proprietors were of a semifeudal nature, and the colonies were governed by the same laws as the feudal manors of the United Provinces.

Pat'ti, Adelina Maria Clorinda, 1843–1919; opera singer; b. Madrid, Spain; brought to U. S. in infancy; when nine years old appeared at a concert in New York City, with remarkable success; November 24, 1859, she made her début in opera at the Academy of Music, New York City, appearing as *Lucia*; made professional visits to Boston, Philadelphia, and other cities; went to Europe, 1861, under the management of Maurice Strakosch; appeared in London, May 14, 1861, as *Amina* in "La Sonnambula"; triumph instantaneous; later sung in all the principal cities of Europe, Mexico, and S. America. In 1868 she was married to the Marquis de Caux; divorced from him, 1878; married, in Wales, Signor Nicolini, an opera singer, 1886 (d. 1898); 1899 married Baron Rolf Cedarstrom; had a magnificent country seat at Craig-y-Nos, Wales.

Pat'tison, Mark, 1813–84; English scholar; b. Hornby, Yorkshire; became rector of Lincoln College, Oxford, 1861; published "Tendencies of Religious Thought in England from 1688 to 1750," "Suggestions on Academical Organization, with Special Reference to Oxford"; "Pope's Essay on Man," with notes; a biography of Milton; celebrated "Life of Casaubon," and other works.

Pau (pō), chief town of Basses-Pyrenees, France, on the Gave du Pau; 600 ft. above sea; 143 m. SSE. of Bordeaux; has fine promenades, commanding magnificent views of the Pyrenees; formerly capital of Kingdom of Bearn and Basse-Navarre, united to France, 1620; has linen, steel, leather, and chocolate manufactures, and active trade in wine, hams, fruit, and flour. Pop. (1906) 35,044.

Paul, name of five popes, who follow: PAUL I, d. 767; b. Rome; succeeded his brother Stephen II, 757; was an able prelate and strengthened the papal authority. PAUL II (PIETRO BARBO), 1418–71; b. Venice; became cardinal, 1440; succeeded Pius II, 1464; noted for his hostility to the spirit of the Renaissance and his persecution of the Humanists. PAUL III (ALESSANDRO FARNESE), 1468–1549; b. Canino; succeeded Clement VII, 1534; published a brief condemning slavery, 1537; excommunicated Henry VIII of England, 1538; approved the order of the Jesuits, 1540, and the convocation of the Council of Trent, 1545. PAUL IV (GIOVANNI PIETRO CARAFFA), 1476–1559; b. Capriglio; Archbishop of Chieti, 1507; nuncio to London; later had high public office at Madrid; Archbishop of Brindisi, 1518; founded the Theatines, 1524; cardinal, 1536; succeeded Marcellus II, 1555; joined France in war for conquest of Naples from Spain, 1555–57; strove for the elevation of his family; hated by the common people of Rome on account of his austere rule. PAUL V (CAMILLO BORGHESE), 1552–1621; b. Rome; became legate to Spain and cardinal, 1596; succeeded Leo XI, 1605; pontificate marked by the interdict laid on Venice, close of the Molinist controversy, establishment of the Congregation of the Oratory and the orders of the Ursulines and the Visitation, and by great activity in the work of missions in the heathen regions.

Paul I, 1754–1801; Czar of Russia; b. St. Petersburg; son of Peter III and Catharine II; succeeded on Catharine's death, 1796; immediately set about to reverse her policy in every particular. In 1799–1800 his troops served in Italy and Switzerland against France; but, 1800, he embraced the cause of Napoleon, and challenged to personal combat any prince who

refused to join him in a league against Great Britain. Meanwhile the puerilities and tyrannies of his rule begot a strong popular discontent, and he was murdered in his bedchamber by his nobles.

Paul, Saint, abt. 1–67; apostle to the Gentiles; b. Tarsus, Cilicia; called SAUL up to Acts xiii, 9, and thereafter PAUL without explanation; was a Benjamite and a Pharisee; also a free-born Roman citizen; learned the trade of tent making; was sent to Jerusalem, where he studied under the great Gamaliel, grandson of Hillel; probably returned to Tarsus, and was dwelling there during the term of Christ's public ministry. After the death of Christ he was again in Jerusalem; became the leader of the persecution which was raging against the Christians; was given by the chief priests authority to proceed to Damascus to stamp out the heresy in that region; on the journey was converted by a vision which changed the course of his life; spent the next three years in retirement in Damascus and Arabia; then returned to Jerusalem, but was forced to flee to Tarsus; soon established himself at Antioch and made that city the starting point of his missionary tours, in company with Barnabas, John, Mark, and others.

In these journeys he crossed the Mediterranean and the Ægean many times; went by land through Syria and the whole of Asia and S. Europe; established churches in nearly every prominent city of Asia Minor and of Greece; in Ephesus, Thessalonica, Athens, Corinth, preached sometimes to groups in the market places, sometimes to assemblies of philosophers. On his return from his third journey, he was arrested in Jerusalem on the charge of profaning the temple by bringing Gentiles into the sacred courts, and of plotting against the Mosaic religion; was saved only by Roman officers from destruction by the mob; suffered a tedious imprisonment; then appealed to the emperor's court; and at last was forwarded as a prisoner to Rome, where, for two years he awaited trial, dwelling in his own house and preaching without molestation. This is the end of all historical record concerning the apostle. Inferences from some of his epistles make it probable that his first trial resulted in an acquittal; tradition says that he then set forth on another missionary journey, which was interrupted by his arrest and his second imprisonment at Rome, where he finally suffered martyrdom. All these rest on very uncertain foundations.

Paul, Saint Vin'cent de, 1577–1660; saint of the Roman Catholic Church; b. Pony, Gascony; took orders, 1600; captured, 1605, by pirates on a voyage from Marseilles to Narbonne; carried as slave to Tunis; escaped, 1607; appointed chaplain to the ex-Queen Margaret of Valois, and; 1622, chaplain to the galleys at Marseilles; went, 1627, to Paris; established and managed charitable institutions, hospitals, asylums, etc., and founded religious fraternities, the Lazarists and the Sisters of Charity; beatified, 1729; canonized, 1737. His order of the Priests of the Mission, confirmed by Parliament, 1631, and settled in the house of St. Lazarus, 1632, became an institution of great importance.

Pauld'ing, James Kirke, 1779–1860; American author; b. Pleasant Valley, N. Y.; became associated with Washington Irving in the authorship of Salmagundi, 1807; second series of Salmagundi, 1819, written by Paulding alone; became secretary of Board of Navy Commissioners, 1814; Secretary of Navy, 1838–41; writings include "The Dutchman's Fireside," a novel, and "Life of Washington."

Paulding, John, 1758–1818; American patriot; b. New York; served through the Revolutionary War, being three times taken prisoner; was one of the captors of Maj. André, for which service he received from Congress a silver medal.

Pauli (pow'lē), **Georg Reinhold,** 1823–82; German historian; b. Berlin; lived in Great Britain, 1847–55; appointed Prof. of History at Bonn, 1855, Rostock, 1857, Tübingen, 1859, whence, for criticizing the policy of the government of Würtemberg, he was removed to Marburg; took similar place at Göttingen, 1870. His works include "King Alfred and his Position in English History," "Pictures from Old England," and a continuation of Lappenberg's "History of England."

Paulicians (pâ-lish'ănz), sect of the Eastern Church; originated in Armenia in the middle of the seventh century, in Mananalis, near Samosata, where lived Constantine Silvanus, its founder, a preacher. They held that the soul proceeded from God, but the body from the evil one; denied the perpetual virginity of Mary, and opposed Mariolatry, the doctrine of the atonement, and the church view of the sacraments. Their founder put an inordinate value on the Pauline epistles. They rejected the Epistles of Peter, because he had opposed Paul, the Revelation, and all the Old Testament. After their founder their great man was Sergius, murdered for his faith's sake, 835. After it had spread quietly in Armenia for about two centuries, the Empress Theodora, 842–857, undertook to suppress the sect. Some fled to the Saracens, others to the Bulgarians, and in Bulgaria remnants of the sect were found as late as the sixteenth century.

Pau'line Epis'tles, The, letters written to churches and individuals by the Apostle Paul.

It is the common opinion that thirteen of these epistles have been preserved to us. From about the fifth century to the Reformation era the Epistle to the Hebrews was also reckoned as a Pauline epistle, making fourteen. This opinion arose in the Eastern Church, and at length became prevalent chiefly through the great influence of Jerome and Augustine.

The common view respecting the order and approximate dates of the epistles may be shown by the following grouping, which is not only chronological, but according to their subject-matter: I. *The earlier or missionary epistles,* I and II Thessalonians, written at Corinth during 52 or 53 A.D. II. *The great doctrinal epistles:* Galatians, written at Ephesus within the period 54–57; I Corinthians, writ-

ten at Ephesus in 57 or 58; II Corinthians, written in Macedonia in 57 or 58; Romans, written at Corinth, 58 or 59 A.D. III. *The epistles of the imprisonment:* Colossians, Philemon, Ephesians, Philippians, commonly believed to have been written during the apostle's Roman imprisonment during the years 62-63. IV. *The Pastoral Epistles:* I Timothy and Titus, written in Macedonia, and II Timothy, written during a second Roman imprisonment, shortly before the apostle's martyrdom. The date of this group is supposed to be 67 or 68.

Paul'ist Fa'thers, or **Congrega'tion of St. Paul the Apos'tle,** missionary society of priests in the Roman Catholic Church, founded in New York City, 1858, by Rev. Isaac Thomas Hecker, and approved by Pope Pius IX.

Paulownia (pâ-lō'nĭ-ă) **Imperia'lis,** scientific name of a fine tree of the family *Scrophulariaceæ,* a native of Japan; has something the habit of a catalpa; leaves large and heart shaped; branches crook and nearly horizontal; flowers in large clusters of a pale violet color; tree rarely exceeds 40 ft. in height, and its trunk is usually less than a foot in diameter. In the U. S. it is hardy as far N. as New York.

Paulus (pow'lŭs), **Heinrich Eberhard Gottlob,** 1761–1851; German theologian; b. near Stuttgart; appointed Ord. Prof. of Oriental Languages at Jena, 1789, at Würzburg, 1803; director of public worship and education at Bamberg, 1808, at Nuremberg, 1809, at Ansbach, 1811; went in latter year as Prof. of Exegesis and Ecclesiastical History to Heidelberg; one of the most prominent representatives of the rationalistic theology in its historico-critical phase; chief works "Philological, Critical, and Historical Commentary on the New Testament" and "Exegetic Manual on the First Three Gospels."

Paulus (paw'lŭs), **Julius,** Roman jurist, contemporary with Ulpian, who held under Alexander Severus, 222, the office of præfectus prætorio; voluminous writer; more than 2,000 excerpts from his works are contained in the digests; most important work, "Addictum," embraced eighty books.

Paulus, Lucius Æmilius (surnamed MACEDONICUS), abt. 230–160 B.C.; Roman consul; b. Rome; son of consul of same name, who fell at Cannæ, 216; was prætor, 191; commanded afterwards in province of Further Spain, where he put down a formidable insurrection and defeated the Lusitanians; consul first time, 181, and second time, 168; censor, 164. During his second consulship he finished the third Macedonian war by his brilliant victory over Perseus at Pydna.

Paulus Diac'onus, or **Levi'ta,** abt. 725–97; Italian historian; b. Cividale, Friuli; ordained deacon not later than 763; at instigation of Adelperga, wife of the Duke of Benevento, composed his "Roman History," a continuation of a work by Europius; entered the monastery of Monte Casino; lived at the court of Charlemagne, 781–87, then returned to Monte Casino; most important work, "History of the Lombards."

Paul Veronese (vā-rō-nā'zā). See VERONESE, PAUL.

Pauncefote (pâns'fōt), **Julian** (Lord), 1828–1902; British statesman; b. Munich, Germany; called to bar at Inner Temple, London, 1852; Attorney-general of Hongkong, 1865; Chief Justice Supreme Court, Hongkong, 1869; knighted, 1874; Assistant Under Secretary of State for Colonies, 1874; Assistant Under Secretary of State for Foreign Affairs, 1876; permanent Under Secretary of State for Foreign Affairs, 1882; minister at Washington, 1889–93; ambassador, 1893 till death; raised to peerage, 1898; senior British delegate to Hague Peace Conference, 1899; d. Washington, D. C.

Pau'perism, condition of large masses of people, more or less dependent on public alms. In earlier ages, slavery, nearly universal, rendered public assistance almost unnecessary, because the master provided for his aged and invalid slaves, but wherever slavery was abolished pauperism took its place. The reduction of large masses of the free population to a state of dependence, by the extension of landed estates and the effect of long-continued warfare, especially under the Roman rule, gave occasion for the greatest development of public charity which the world has seen. Laws cheapening the price of grain and afterwards providing for its distribution from the public granaries among the free-born poor of Rome and the provinces, laid the foundation of a pauper system which prevailed from the time of Sulla through the flourishing period of the empire.

With the introduction of Christianity, the establishment of monasteries and even of churches, increased the number of persons who lived by begging, and vagrancy and mendicity were common, when the legislatures of Europe recognized the evil. The first poor laws of England and France were statutes against vagrancy and mendicancy. In England the breaking up of monasteries at the time of the Reformation, and the change in the administration of church funds in the parishes, threw many who had been relieved by the clergy or their servants upon the civil authorities for support or relief. Economical changes going on at the same time (1520–1620) caused the number of poor people in England to increase greatly. There was much poor-law legislation, 1540–1601, when the statute 43 of Elizabeth, which forms the basis of the pauper system both in England and the U. S., was enacted.

France recognizes the duty of public aid, although its poor law has never been carried so far as the poor-law system of England. The French system closely resembles that which has grown up in the U. S. The first step in this system is the creation of a local board, or charity bureau (*bureau de bienfaisance*) and in the U. S. a board of overseers, guardians, supervisors, etc. These boards, both in France and the U. S., first distribute "family aid" (*secours a domicile*), which is what the English term "outdoor relief," meaning relief given outside the workhouse door. Great Britain and Denmark have pension laws, guarded by many restrictions, for

their aged poor. In Germany preventive measures are compulsory insurance of workmen against sickness and old age and against accidents by employers. In the U. S. the localities are everywhere expected to support their own poor by taxation; but the prevalence of the county system in many states, the township in others, and of a combination of township, county, and state systems in some localities, makes it difficult to say what usages prevail in the Republic as a whole. The formation in many cities since 1870 of charity organization societies has promoted inquiries into the state of the poor, guarding against much imposture, and relieving those truly in need. In Great Britain $82,538,450 were expended, 1905, by unions and parishes for the poor; number relieved, 932,267. In France the *bureau de bienfaisance* expended, 1904, 46,810,251 fr., and assisted 1,381,387 persons. In the U. S., January 1, 1904, the number of paupers in almshouses was 81,764.

Pausanias (pâ-sā'nĭ-ăs), d. 468 B.C.; Spartan general; son of Cleombrotus and regent of Sparta during the minority of his cousin Plistarchus, son of Leonidas; commanded the Greeks at Platæa 479 B.C., and achieved several brilliant victories during the following years; but, elated by these successes, and led astray by an exorbitant ambition and vanity, he entered into treasonous negotiations with the Persians. The Athenians denounced him and the Spartans suspected him. Twice he was recalled from the army and arraigned before the ephors, but no proofs could be presented, and he was acquitted. At last a letter from him to Xerxes was delivered to the ephors by the slave intrusted to carry it to the Persian camp, and when he learned that his treason was discovered he took refuge in the Temple of Athene Chalcioecus, where he was allowed to die of hunger.

Pave'ment, covering of wood, stone, brick, or asphalt, laid firmly on a street to give a smooth surface for travel. A street pavement should be durable, readily cleaned and repaired, give a secure foothold, not become slippery from use, and be as noiseless as possible. It should also be of such construction that the original cost plus the maintenance may be a minimum. The most common foundation is sand or gravel, laid in a thickness of from 3 to 6 in. Cobblestones set firmly in sand or gravel, rubblestones set on edge in contact, and rubblestones set on edge but not in contact with the voids filled with concrete, are also used. The best wooden pavement is composed of rectangular blocks, 3 to 4 in. in width, 6 to 14 in. in length, and 6 in. deep, which are laid in courses across the street with an open joint three quarters of an inch wide between the courses. This is also laid on a foundation of sand covered with boards, and the joints filled with coal tar and gravel. The wooden blocks are creosoted to prevent decay. The best stone pavements are of rectangular blocks set in contact in rows running across the street, and resting on a foundation of concrete. The Belgian pavement is formed of nearly cubical blocks, the edge of the cube being from 5 to 7 in. long; trap rock is generally employed on account of its toughness. The pavement on Broadway, New York City, is of granite blocks from 4 to 5 in. wide, 10 to 15 in. long, and 8 to 10 in. in vertical depth. The blocks are set in close contact on the foundation, over which a layer of sand is laid, and are then rammed with heavy wooden rammers. The joints are filled with sand, or sometimes with asphalt.

Brick used for pavement is hard burned, usually without being vitrified, and should be of uniform hardness and low porosity. The bituminous limestone or asphalt rock of Switzerland, when heated, crumbles to powder, which, when spread on a foundation in a sheet 2 or 3 in. thick and compacted by ramming, makes an excellent road covering. The bitumen from Trinidad mixed with sand makes a compound resembling that derived from natural asphalt rock. It is also used in rectangular blocks or bricks, made under pressure. Such pavements are durable, the wear compacting the material instead of grinding it away. For heavy traffic nothing but stone blocks will prove satisfactory, while for lighter traffic brick or asphalt may be preferred. Stone is the most durable and wood the least, while asphalt and brick lie between the two. Wood is the cheapest in first cost, brick next, followed by asphalt, while stone is the dearest. Regarding maintenance and repairs, probably asphalt stands first, stone second, and wood last. In the important matter of cleanliness and hygienic considerations asphalt stands first, brick second, and stone third, while is liable to many grave objections. See ROADS.

Pavia (pä-vē'ä), ancient, *Ticinum*, city of Italy; on the Ticino; 21 m. S. of Milan, with which it is connected by a canal; formerly called the "City of the Hundred Towers." The churches of Pavia are of great historic and architectural interest; among them are San Michele Maggiore, of the sixth or seventh century, perhaps the first specimen of Lombard architecture existing, and the Cathedral of San Stefano (founded 1488), containing the monument to St. Augustine and the remains of Boethius. The Univ. of Pavia is said to have been founded by Charlemagne. The Museo Malespina contains some good pictures and a fine collection of engravings. Near Pavia is the picturesque old church Beato Lanfranco; but the great attraction of the neighborhood is the magnificent Certosa di Pavia. Pavia is of very ancient, probably Ligurian, origin, was important under the Romans, and had a Christian church, 326. In 573 it became the Lombard capital, and for two hundred years was a rich and great city. In 1524 Francis I of France suffered a terrible defeat under its walls and was taken prisoner by the troops of Charles V. Bonaparte having taken Pavia (1796), at the prayers of the citizens limited his soldiers to a sack of three hours, so that the town was not totally destroyed. By the Peace of 1814 it returned to Austria, and after the battle of Solferino became a part of the Kingdom of Italy. Pop. (1901) 35,447.

Pawn. See BETEL.

Pawn'broker, one who lends money, at interest, on the security of goods deposited with him, having power to sell the goods if the principal and interest be not repaid within a specified time. Among the first who made a business of lending money on pledges were probably Jews and the Cahorsins or Caursins. The latter are supposed to have been natives of Cahors, in France. In the course of the thirteenth century Italian merchants from Lombardy established themselves in England and France, and afterwards in other countries of Europe. They were bankers and money lenders as well as merchants, and on account of the precariousness of credit took pledges in security. Lombard Street in London and the Rue des Lombards in Paris became financial centers, and the name Lombard the synonym of money lender and usurer. In the fifteenth century efforts were made to deliver the needy from their extortions by the establishment of *monts de piété* and, 1530, the Lombards were expelled from England, and in the next century from France. The system of pawnbroking as it exists in the U. S. is borrowed directly from that of England, and the subject is regulated by statutes or legal ordinances, the general effect of which is to restrict the interest that may be charged, and in other ways provide for the protection of the borrower, as by restricting the hours of business, requiring tickets to be given for each pledge, etc. The modern pawnbrokers' sign, the three golden balls, is supposed to be derived from the arms of the corporation of Lombards, or from the armorial bearings of the Medici family, who were among the wealthiest of the Lombard merchants.

Pawnees (pâ-nēz'), tribe of N. American Indians, long resident on the Platte and its tributaries in Nebraska, with occasional sojourns on the Kansas; were divided into four bands; hostile to the Spaniards before and after the cession of Louisiana to the U. S., but always friendly to Americans; number reduced by wars with Sioux and other tribes; remnant settled on reservation in Indian Territory, 1876; numbered about 700, 1900.

Pawtuck'et, city in Providence Co., R. I.; on Blackstone and Pawtucket rivers; 4 m. N. of Providence; birthplace of the cotton-manufacturing industry in the U. S., initiated, 1790, by Samuel Slater. The Blackstone here has a fall of about 50 ft., furnishing abundant power for manufacturing, and is spanned by several bridges. The city has several public parks; system of waterworks introduced, 1878, at cost of $1,333,000 and enlarged at a cost of $500,000; public library; public-school property valued at over $850,000; manufacturing plants, with capital (1909) $40,094,000 and products $37,696,000, chiefly cotton, woolen, hosiery, and knit goods, foundry and machine-shop products, and electrical supplies. The city was settled about 1655; included in Bristol Co., Mass., till 1861; incorporated as city, 1885. Pop. (1910) 51,622.

Pax, among the Romans, goddess of peace.

Pax, small tablet anciently used in the Roman Catholic Church, called also the *tabula pacis* ("tablet of peace"), or the *osculatorium,* bearing the image of Christ crucified, or of the Lamb, which was kissed first by the bishop, then by the inferior clergy, and finally by the people. The ceremony originated in the custom prevalent in the early Church of "greeting one another with a holy kiss." In Roman Catholic churches at the present day a relic of this usage still exists, called giving the pax. Just before the communion at solemn high mass the officiating clergyman extends his hands to the deacon, saying, *Pax tecum* ("Peace be with you"), to which the deacon answers, *Et cum spiritu tuo* ("And with thy spirit"). The deacon gives the pax in turn to the subdeacon, and so on, the people having no part in it.

Payn, James, 1830–98; English novelist; b. Cheltenham; 1858 became editor of *Chambers's Journal,* 1882 of *The Cornhill Magazine*; published books, chiefly novels, exceed 100 in number, and include "Lights and Shadows of London Life," "Won, Not Wooed," "What He Cost Her," "Under One Roof," and "The Eavesdropper."

Payne, John Howard, 1792–1852; American dramatist; b. New York City; first appeared as an actor in New York City, 1809; played in London, 1812–13, where he produced an original drama, "Clari, or the Maid of Milan," for which he wrote the song "Home, Sweet Home"; U. S. Consul at Tunis, Africa, 1841–45, and, 1851, till death; remains removed to Washington, D. C., 1883; most noted play, "Virginius."

Paysandú (pī-săn-dō'), capital of department of same name in Uruguay; on the Uruguay; 214 m. NW. of Montevideo; center of a rich grazing region; has a large trade, by river, in cattle and hides. During the War of 1864–65 between Brazil and Uruguay, Paysandú was taken by the Brazilians, January 2, 1865, after an engagement of fifty-two hours.

PEA LEAVES, FLOWERS, AND FRUIT.

Pea, plant of the family *Leguminosæ,* much prized in temperate countries for its seeds; known to botanists as *Pisum sativum*; native to Asia. The field pea, *P. arvense,* is much grown in the N. parts of the U. S. and in Canada as a forage plant. The garden peas fall into two general categories—the common or shelling sorts and the sugar or edible-podded varieties. The shelling peas are those commonly grown in

the U. S., the edible product being the seeds alone, which are shelled from the pod. The edible-potted peas are those which possess a soft pod, which does not burst open when the seeds are ripe. The pod, with the inclosed seeds, is eaten in the green state, much as "string" beans are used. The sweet pea is prized for its many-colored and sweet-scented blossoms.

Pea'body, George, 1795–1869; American philanthropist; b. S. Danvers (now Peabody), Mass.; merchant in Georgetown, D. C., and Baltimore, Md.; settled in London, England, 1837; established banking house there, 1843; accumulated large fortune; began public benefactions, 1852. In that year he fitted out Dr. Kane's Arctic expedition ($10,000) and founded Peabody Institute at his birthplace ($30,000, later increased by $170,000) and a similar institution at N. Danvers ($50,000); 1857, founded Peabody Institute at Baltimore ($300,000, later increased to $1,000,000). In 1862 completed plans for lodging houses for the poor in London (in all costing $2,500,000); 1866, founded an institute of archæology at Harvard ($150,000) and department of physical science at Yale ($150,000); gave to trustees a fund for promoting education in the S. states ($2,100,000, increased, 1896, to $3,500,000), and made gifts to other objects ($200,000); 1868, endowed an art school in Rome, Italy; 1869, the Peabody Museum in Salem, Mass. ($150,000), and made other gifts ($165,000). He died in London, and after funeral honors in Westminster Abbey his remains were sent to the U. S. on a British warship.

Peace, in international law, a suspension of war and a return to a state of intercourse such as existed before war, and to amnesty, or the oblivion, the waiving, of all future claims on account of those particular acts of injury for which a war was initiated. For the existence of peace a treaty is necessary, unless, indeed, complete conquest and absorption of an entire country has taken place, when there would be no one to negotiate with. Such a treaty, if there be a number of belligerents, may be made by all the parties on one side with all on the other; or each on one side may make a treaty with every other. If any question of ownership is left unsettled by the treaty of peace, property of every kind remains legally in the hands of that state which at the close of hostilities actually was master of it. The effects of a treaty of peace, in particular the cessation of all war operations, begin at once upon its signature, even if ratification still remains necessary, unless the contrary is specified.

Peace Con'ference. See HAGUE TRIBUNAL; INTERNATIONAL PEACE CONGRESS.

Peace Riv'er, river of Canada, which rises in the Coast Range Mountains N. of British Columbia, and flows NE. through the Rocky Mountains to near Athabasca Lake, more than 600 m., where it turns N., and under name of Slave River enters Great Slave Lake; navigable for most of its extent.

Peach, fruit tree of the rose family, widely cultivated in all countries where the climate is not too severe. Its botanical name was formerly *Persica vulgaris*, but from its close affinity with the almond it was later called *Amygdalus persica*; now most botanists agree in referring it to the genus *Prunus*, which includes the plum, and call it *P. persica*. The tree is of medium size, with a spreading head rarely reaching 30 ft., and usually not more than 15 or 20 ft. high. It is commonly regarded as a short-lived tree, but in a genial soil and climate it attains a good age. The peach stone is not the seed proper, but a portion of the pericarp or seed vessel; the stones of the different varieties differ much in their relative length and breadth, and some are terminated by a long, sharp point. The seed proper, or meat, as it is popularly called, has a very strong flavor of the bitter almond, and, like that, is accompanied by prussic acid; the same flavor is perceptible in the leaves. As a fruit, the peach is everywhere held in high esteem, but is nowhere so largely cultivated as in the U. S., where the canning of peaches has become an immense industry. A type of peach has arisen with a perfectly smooth, plumlike skin, known as the nectarine; the ordinary peach has a fuzzy skin. The peaches proper, exclusive of the nectarines, fall into two general classes—the clingstones and the freestones, terms referring to the manner in which the flesh joins the pit. These classes grade into each other.

Peach Curl, fungous disease of peach leaves and twigs, in which they become swollen, curled, and deformed; caused by a minute parasitic fungus, *Exoascus deformans*, which penetrates the tissues of the leaf and finally produces spore sacs on the surface. The early removal and destruction of all the diseased leaves and shoots, and spraying the trees in early spring with a thirty or forty per cent solution of iron sulphate are recommended.

Peach Yel'lows, contagious disease of peach trees characterized by yellowish-green foliage, dwarf shoots, and prematurely ripened, often reddish-stained fruits. A year or two after the first attack the trees die outright, or languish for several years. No cure is known; all that can be done is to remove and burn the affected trees.

Pea'cock, Thomas Love, 1785–1866; English author; b. Weymouth; employed in the East India Company's office, London, 1818–56; works include "Headlong Hall," "Nightmare Abbey," "Gryll Grange," and poems, "Palmyra," "The Genius of the Thames," and "Rhododaphne."

Peacock, any bird of the genus *Pavo* and family *Phasianidæ*. The several species are remarkable for the long and showy tail coverts of the male. Three species are recognized: (1) The common peacock (*Pavo cristatus*); (2) the black-shouldered peacock (*P. nigripennis*); and (3) the Jason peacock (*P. muticus*). The common peacock is a native of S. and SE. Asia, but is now naturalized in

many parts of the world. Its flesh was formerly used for food; but, except when young,

PEACOCK.

it is scarcely palatable. The white peacock is an albino of the ordinary species.

Peacock Pheas'ant, any pheasant of the genus *Polyplectron*; so called from the fact that the plumage, and especially the tail feathers, of the males are adorned with large eyelike spots, suggesting those of the peacock.

Peale, Charles Willson, 1741–1827; American painter; b. Chestertown, Md.; was saddler, silversmith, watchmaker, and carver; studied under West in London; settled in Philadelphia, and applied himself to portraiture. His works include several portraits of Washington and a series forming the nucleus of a national gallery; founded the first American museum. He was first American manufacturer of enamel teeth.

Peale, Rembrandt, 1778–1860; American painter; b. Bucks Co., Pa.; son of the preceding; studied under his father and West in London; spent several years in Paris; settled in Philadelphia, 1809; painted portraits, "The Roman Daughter" and "The Court of Death," the latter 24 × 13 ft., and widely exhibited, and published a biography of his father, "Portfolio of an Artist," "Notes on Italy," and "Graphics."

Pea'nut. See GOOBER.

Pear, fruit of the rose family (*Pyrus communis*); closely related to the apple. The habit of the tree is often pyramidal, with ascending branches; wood very hard and close, and when dyed black is used by cabinetmakers as a substitute for ebony; also used by engravers for coarse work; fruit usually sugary and melting, with concretions near the core of indurated cells, which are exceedingly hard. The pear is a native of the temperate portions of Europe and the Caucasus, and was cultivated in very early times. The tree is long-lived, several specimens in England having

PEAR BLOSSOMS.

been known to be about four hundred years old, and the one planted by Peter Stuyvesant in New York City was at the time of its destruction (1867) more than two hundred years old. Of all the thousands of varieties of pears, the number grown for profit is very small, rarely more than a dozen, and there are a few kinds, especially the Bartlett, which are successful and popular everywhere. The Seckel, though small, is universally popular, and no native or foreign variety yet known surpasses or even equals it in quality. Considerable quantities of pears are canned; the drying of the fruit is more common abroad than in the U. S.

Pearce, Charles Sprague, 1851– ; American figure and portrait painter; b. Boston, Mass.; pupil of Bonnat in Paris; member Society of American Artists, 1886; honorable mention, Paris Salon, 1881; third-class medal, Paris Salon, 1883; Temple gold medal, Pennsylvania Academy, Philadelphia, 1885; medal of honor, Ghent Exhibition, 1886; second-class medal, Munich Exhibition, 1888; gold Staats medal, Vienna, 1898; member of international jury of awards, Paris Exposition, 1889; grand diploma, Berlin Exhibition, 1891. Studio, Auvers-sur-Oisé, France.

Pea Ridge, range of hills in Benton Co., Ark., noted for the battle fought there, March 6–8, 1862, between the Union forces under Gen. Curtis and the Confederates under Gen. Van Dorn, resulting in the defeat of the latter.

Pearl, secretion of the "mantle" or lining membrane of various kinds of shellfish, consisting, like the shell itself, of carbonate of lime united with animal matter. Pearls are of the same color as the interior of the shell in which they are found—white, black, pink, etc., but generally "pearly," or nacreous, as it is

termed—*i.e.*, with a play of delicate tints. The quality of a pearl is termed its orient. They are often attached to the inside of the shell, or are irregular or distorted in form, and have then but little value, only those of finely rounded shape or pear-shaped being employed in fine jewelry. The pearls of commerce come chiefly from a large shellfish known as the pearl oyster (*Meleagrina*), and are procured mainly in the Persian Gulf and on the W. coast of Mexico. The shells themselves yield "mother-of-pearl." Along the California coast the brilliant pearly green abalone shells (*Haliotis*) are gathered in like manner for inlaid work and ornaments, and in them are found green pearls. Pink pearls, not nacreous, are obtained from the large pink conchs (*Strombus*) of the W. Indies. The river shells or "fresh-water mussels" (*Unios*), yield pearls also, and they abound in the rivers of the U. S. Some fine pink, cherry-colored, and other "fancy" pearls have been found in the rivers of Ohio and other states. The earliest recorded fisheries were those carried on in the Persian Gulf and on the coast of Ceylon. Later the Red Sea furnished pearls for the Egyptians, and after the discovery of America large numbers were taken from the Gulf of Panama and along the N. coast of S. America. At present the most important fisheries are in the Persian Gulf, Gulf of Manaar—between Ceylon and the mainland—Gulf of California, Sulu Archipelago, and on the tropical coasts of Australia.

Pearl Har'bor, inlet on S. coast of Oahu, Hawaii, 5 m. W. of Honolulu; granted to U. S., 1884, for a naval coaling and repair station.

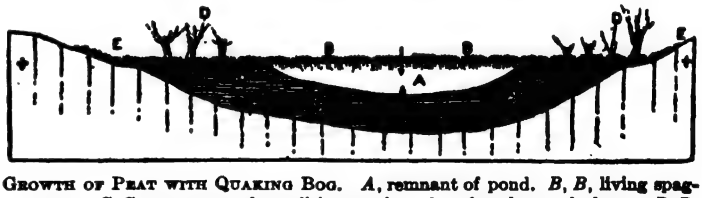
Pearl Riv'er, river formed by several head streams which unite in Leake Co., Miss.; flows in a S. course for 250 m. into the Mississippi, and is for some distance the E. boundary of Louisiana.

Peary (pē'rĭ), **Robert Edwin,** 1856– ; American Arctic explorer; b. Cresson Springs, Pa.; entered the civil engineer corps of navy, 1881; with one companion, penetrated the Greenland ice cap for 100 m. in lat. 69° 30′ N., 1886; went, with six companions, to McCormick Bay, NW. Greenland, to study the Eskimos, 1891; in sledge journey of 1,300 m. discovered Independence Bay, on the NE. coast (lat. 81° 37′ N.), 1892; partly outlined Peary Channel, supposed to be the N. limit of Greenland, which he proved to be an island; reached Independence Bay again, 1895, but was unable, on account of failing supplies, etc., to explore the archipelago to the N. of Greenland; again went to the N., 1898, returning, after making important explorations, 1902. In 1905–6 in the ship *Roosevelt* he reached lat. 86° 30′ N. He published, 1898, "Northward Over the Great Ice." His wife accompanied him on several expeditions as far as winter quarters in Greenland, and in that country gave birth to a daughter; published "My Arctic Journal" and "The Snow Baby." August 1, 1908, Peary left Cape York, Greenland, on the trip which culminated in the discovery of the North Pole. Leaving his ship, the *Roosevelt*, at Cape Sheridan, February 15, 1909, he began his sledge journey across Grant Land to Cape Columbia. Thence, March 1st, accompanied by 7 other members of the expedition, 17 Eskimos, 133 dogs, and 19 sledges, he started on his final dash 420 m. due N., reaching the Pole, April 6th. In 1911 he was promoted to the rank of rear-admiral by special act of Congress.

Peary Land, interior of N. Greenland, between 78° and 82° N. lat., explored and described by Robert E. Peary, U. S. navy, who crossed it four times, 1892 and 1895. He found the entire interior of Greenland to be a huge snow dome, in places 10,000 ft. high, absolutely devoid of life of any kind. The region was named Peary Land by the Philadelphia Geographical Society.

Peas'ants' War, uprising of the peasants of S. and central Germany, 1525, due to their miserable social condition and to the religious fanaticism enkindled in ignorant minds by the Reformation. It was directed against the nobles and the clergy, and extended from the Alps to the Hartz and from the Rhine to the Bohemian frontier. With the exception of a few cases (as Thomas Münzer and Götz von Berlichingen), the peasants had no leaders and no organization. They gathered together in bands of 8,000 to 30,000. Castles were burned, monasteries destroyed, cities plundered, and the most atrocious cruelties committed. They were routed or massacred by regular armies, and in a few months the war was at an end.

Peat. In many N. countries the vegetation of mosses, ferns, sedges, confervæ, rushes, reeds, and numerous small plants accumulates in swamps, morasses, and low places, each winter adding its quota to the mass of decomposing vegetable matter, in its turn the soil of a new vegetation the ensuing spring. Thus considerable accumulations are formed in process of time, the lower portions of which are black, unctuous, and somewhat dense, and are called peat. In Europe the possibility of using it for fuel and as raw material has been long determined where approximately 10,000,000 tons of peat fuel, prepared for market by various processes, are consumed each year. In Sweden, Germany, and other countries of N. Europe peat is being used successfully, in



Growth of Peat with Quaking Bog. *A*, remnant of pond. *B*, *B*, living sphagnum. *C*, *C*, peaty moss from disintegration of surface layer of plants. *D*, *D*, solid part of swamp with trees.—After Shaler.

plants built at the bog, as a source of producer gas for use in internal-combustion engines to generate electricity for lighting, traction, and manufacturing purposes in towns miles away. Some of the plants which are so operated are built in units of 150 horse power and develop less than 500 horse power for the entire plant. It is used with success in metallurgical operations, as in foundries and steel works, and in brick and glass making, as well as in various ceramic kilns.

Peat, made into fuel, has extensive use in stoves for cooking and heating, in the form of air-dried blocks or sods, cut from the bog by hand labor with special forms of spades. A more compact and efficient fuel is made by more or less thoroughly macerating the freshly dug, wet peat and pressing it into molds, after which it is allowed to drain and dry by spreading the blocks on the ground exposed to sun and wind. A somewhat more modern method of preparation is to grind it in a specially designed mill similar to the pattern commonly used in grinding clay for brick making. The peat is ground wet as it comes from the bog, and is delivered from the mill in the form of wet bricks, which on exposure to the air and the heat of the sun for a comparatively short time become dry, firm, tough, and, compared with untreated peat, nonabsorbent. This is "machine peat" of the European markets.

Of the more fibrous kinds of peat large quantities are used in Europe for bedding for live stock, and as powder for absorbent and sanitary purposes. Thousands of tons are imported from Europe; and one Indiana factory sells its entire output of several hundred tons at about $12 per ton. Of this kind of peat, 2,578,000,000 tons are available in America, representing, at $10 a ton, a prospective value of $25,780,000,000. Another and an extensive use for peat in the U. S. is that of fertilizer filler. The peat is dried and pulverized, and in this form is especially adapted to the purpose, since it absorbs water and ammonia greedily, is antiseptic and an effective deodorizer, and prevnts chemical decomposition better than any other substances ever used in a similar way. Assuming that one half of the entire estimated amount of peat is suitable for the product, its value would be at least $38,666,000,000.

The peat deposits in the U. S. lie along the N. boundary and in the coastal plain of the Atlantic region, and there are probably workable peat beds in the swamps of the Gulf states and in the parts of the flood plain of the Mississippi and its tributaries lying at a distance from the streams. If converted into machine peat bricks, at $3 per ton, the value of the latter would be $38,665,700,000, or about the same as the value of half of it used as fertilizer filler.

Peb'ble, small water-worn stone of any variety. Scotch pebble is agate. Brazilian pebble is a transparent rock crystal, used for making lenses; is inferior to good glass; most of the so-called pebble spectacles are of common glass.

Pecan', species of hickory growing on river banks from Indiana to Texas; well known for its nuts. The tree is tall, slender, and has a

PECAN, FRUIT AND LEAF REDUCED.

hard timber. In states bordering the Gulf of Mexico it is planted in orchards for its nuts, and a score or more of named varieties are grown.

Pec'cary, any one of certain swinelike animals composing the family *Dicotylidæ*. The peccaries are of two species, both American. The collared peccary (*Dicotyles tajacu*) ranges

COLLARED PECCARY.

from Arkansas SW. through Mexico and over a great part of S. America; is 3 ft. long and sometimes weighs 60 lb. The white-lipped peccary (*D. labiatus*) is a larger S. American species.

Pechili (pā-chē-lē'), former name of province of China, now known as Chihli.

Pechili, Gulf of, inlet of the Yellow Sea, S. of Gulf of Liao-tung, W. of Korea Bay; receives waters of the Pei-ho, Hoang-ho, and Chan-tu rivers.

Pecht. See BUBASTIS.

Pecos (pā'kōs) **Riv'er,** stream of New Mexico and Texas; rises in San Miguel Co., N. M.,

and flows in a general SSE. course, falling into the Rio Grande del Norte after a course of 800 m.

Pecquet (pā-kā'), **Jean,** abt. 1620–74; French anatomist; b. Dieppe; discovered and demonstrated the course of the lacteal vessels in the body; wrote "Experimenta Nova Anatomica," "De Circulatione Sanguinis et Chyli Motu," and "De Thoracis Lacteis."

Pec'tose, important principle of vegetable bodies, from which proceed all the gelatinous constituents of fruits and vegetables; exists largely in unripe fruits and roots, being, like cellulose, one of the "plastic" constituents, and giving the hardness to green fruits. It exists in all parts of vegetable bodies, and is always accompanied by a peculiar ferment substance called pectase, which has the power to transform it, during the ripening of the fruit or maturation of the plant, into the plant jelly or pectin.

Pedagog'ics, science of education; a body of educational doctrine pertaining to the mental and moral training of the young. Depending mostly on psychology for guidance as to ends and means, it is developed in various ways according to the psychological standpoint of the author. Some writers make much of what may be called the *a priori*, or rational, phase of psychology, deducting maxims for instruction and moral training from the original constitution of mind. Rosenkranz, in his "Philosophy of Education," is perhaps the best exponent of this method of treatment. Dr. William T. Harris points out that there are five windows of the soul to be opened by these studies: In the elementary school, arithmetic and physics open the soul to a quantitative knowledge of inorganic nature; geography and natural history to organic nature; history gives an insight into the will of man as manifested in institutions; literature, drawing, and the like, cultivate the æsthetic or emotional sides of the soul; while grammar helps the mind to look within at its own processes. Thus three windows reveal what is within, *viz.*, intellect, sensibilities, and will, while two reveal what is without, *viz.*, organic and inorganic nature.

Another class of educational writers inquire, not what is the original equipment of the mind, but how does it grow? with what contents is it and ought it to be filled? In this view all the facts revealed by rational psychology and the self-realization of the mind are assumed but scarcely mentioned, attention being focused on the concrete studies, their choice, sifting, sequence of topics, and coördination; also their treatment as to methods of presentation. Everything is examined from the empirical, or experience, side of psychology.

A third standpoint from which to investigate educational questions is child study on a physiological basis. The senses are the medium through which the child gains his experience of the outer world, and the physical side in general is a constant factor in mind growth. It follows, therefore, that a large number of important topics in education have a physiological aspect. The tonic and quantitative relations between external stimuli and the corresponding response of the mind in sensations are investigated by many experiments in the domain of touch, taste, smell, hearing, and vision. The contents of children's minds are determined, as are also their fancies, falsehoods, tastes, ideas of justice, powers of graphic representation, conceptions of religion, and the like. Their capacities for apperception, association, memory are investigated by experimentation. Likewise, the conditions of health and disease for the senses and the nervous system, as well as for digestion, circulation, and respiration, are studied, and deductions made as to light, temperature, ventilation, size of type for books, bodily position, etc. It is chiefly from these three standpoints —rational psychology, the psychology of experience, and child study on a physiological basis—that the problems of education are examined. See CHILD STUDY; COLLEGES; EDUCATION; MANUAL TRAINING SCHOOLS.

Pedee (pē-dē') **Riv'er,** river formed in N. Carolina by the union of the Rocky and the Yadkin rivers; it flows SSE. into S. Carolina, and reaches Winyaw Bay. In its lower course it is often called the Waccamaw, properly the name of an affluent. The principal tributary is the Little Pedee. It is navigable 150 m.

Ped'iment. See GABLE.

Pedom'eter. See ODOMETER.

Pedro (pē'drō) **I** (DE ALCANTARA) of Brazil, and **IV** of Portugal, 1798–1834; b. near Lisbon. His father, on becoming King of Portugal as John VI, 1821, appointed him regent of Brazil, then a kingdom. When it was proposed in Lisbon to reduce it again to a colony, a revolution broke out, the lead of which Dom Pedro took; and the country being declared independent in October, 1822, he was proclaimed constitutional emperor, and on December 1st was crowned. His father dying, 1826, he became King of Portugal, but immediately abdicated in favor of his infant daughter, Dona Maria da Gloria. A popular tumult in Rio de Janeiro compelled him to abdicate his Brazilian throne in favor of his son, April 7, 1831, and he then bent his energies to combat the usurpation of Dom Miguel in Portugal. He landed at the Island of Terceira, one of the Azores, issued a decree in favor of Dona Maria, and began a war which terminated successfully 1834.

Pedro II (DE ALCANTARA), 1825–91; Emperor of Brazil; son of the preceding; b. Rio de Janeiro. In his sixth year became emperor by the abdication of his father; crowned, July 18, 1841, and proved to be a most enlightened ruler and a man of unusual attainments and prodigious activity. The wars with the Argentine dictator Rosas and Lopez of Paraguay and the enactment of gradual abolition of slavery are the principal events of his reign. In 1843 he married a daughter of Francis I of the Two Sicilies. Their only surviving child, the Princess Isabella, wife of the Count d'Eu, acted as regent during the emperor's travels,

1871–72 and 1876–77. The republicans opposed her for alleged subserviency to the Church, and because she was married to a foreign prince. Discontented army officers excited a mutiny at Rio de Janeiro, and proclaimed a revolution, November 15, 1889. The emperor abdicated without resistance, was at once sent with his family to Portugal, and a republic was established.

Pedro, Dom, DUKE OF COIMBRA and REGENT OF PORTUGAL, 1392–1449; son of John I of Portugal and Philippa of Lancaster, daughter of John of Gaunt. In 1439 the Cortes appointed him defender and regent of the kingdom. His daughter Isabella was married to the young king, Alfonso V, 1446. A quarrel with his illegitimate brother, the Duke of Bragança, resulted in civil war, and Bragança gained the king to his interest. Pedro met the royal troops with a force of 1,000 horse and 5,000 infantry, and in the battle of Alfarrobeira was defeated and killed.

Pedro the Cru'el, 1334–69; King of Castile and Leon; succeeded his father, Alfonso XI, 1350, and, 1353, married Blanche de Bourbon, sister of the King of France, but in three days deserted her for his mistress Dona Maria Padilla. He put to death two of his natural brothers and many other persons, and poisoned his queen. Finally his natural brother, Henry of Trastamare, rose against him, and the pope excommunicated him. Henry was driven to France, but, 1365, revived his claim, and received the aid of the French king. Pedro fled, but Edward the Black Prince placed him again on the throne. Edward subsequently deserted him in disgust, and Pedro fell in the battle of Montiel by the hand of his brother, who succeeded him as Henry II.

Peel, Sir Robert, 1788–1850; British statesman; b. near Bury, Lancashire; son of Sir Robert Peel, cotton manufacturer and member of Parliament; entered Parliament, 1809; Under Secretary for the Colonies, 1811; Chief Secretary for Ireland, 1812–18, where his Tory principles led to severe criticisms from the opposition. He established the Irish constabulary; represented Oxford in Parliament, 1818–22; introduced and carried, 1819, a bill to return to specie currency; Home Secretary, 1822–27, 1828–30; introduced and carried important reforms in the administration of criminal law; remodeled the London police; moved the bill for Catholic emancipation, 1829, and thus broke with the Tory leaders. Oxford rejected him in the new election; he reëntered Parliament for Westbury, and represented Tamworth, 1832–50; First Lord of the Treasury and Chancellor of the Exchequer, 1834–35; later headed the Conservative opposition; Premier, 1841–46, and a free trader; supported the repeal of the Corn Laws; later acted generally with the Whigs. He refused the Garter and the peerage, and was universally respected for honesty, truthfulness, and ability.

Peele, George, abt. 1553–98; English dramatist; b. Devonshire; settled at London as a theatrical writer; was an associate of Nash, Marlowe, and Greene, and author of half a dozen plays, the best of which is "David and Bethsabe."

Peepul (pē'pūl). See BO, or PEEPUL TREE.

Peer, nobleman having a special dignity or privilege. The meaning of the term has varied widely at different times. Thus in England the earlier usage, as in the phrase of Magna Charta, "judgment of his peers" (*judicium parium*), gives it merely the general meaning of equals, while at present it is used in a special sense to denote the members of the nobility and those prelates of the Church of England who are entitled to a seat in the House of Lords. The members of the nobility entitled to be called peers include dukes, marquises, earls, viscounts, and barons. In France Louis XVIII created in 1814 a house of peers, but this peerage comprised only a very limited number of the whole class of the nobility. The attempt to make it hereditary failed, and, 1848, the Chamber of Peers ceased to exist.

Pee'wit. See LAPWING.

Peg'asus, in Grecian mythology, a winged horse, offspring of Medusa and Neptune. His place, according to most ancient writers, was in the palace of Jupiter, whose thunderbolts he carried; but others place him among the stars as the horse of Aurora, or represent him as the horse of the Muses, who by a stroke of his hoof produced the inspiring fountain Hippocrene on Mt. Helicon. PEGASUS, a N. constellation of second magnitude. Its three brightest stars with the brightest star of the constellation of Andromeda form the "square of Pegasus." The figure represents the forward half of a winged horse, called the "Flying Horse." The center of the constellation is about 20 degrees N. of the equator, and it is on the meridian at midnight in September.

Pegu (pē-gō'), name of geographical and historical interest associated with the NW. part of the Indo-Chinese peninsula, adjoining the Bay of Bengal, and especially about the Gulf of Martaban; has sometimes been a separate kingdom, sometimes a dependency of Burma, and the territory covered has extended as far N. as Ava, sometimes as far S. as the Peninsula of Kra; is now a division of Burma, occupying the lower valleys of the Irawadi and Salwen rivers from Tenasserim to S. Arrakan. The town of Pegu, formerly a capital and important city, is now a small town and railway station, 45 m. NE. of Rangoon.

Peh-la, or Pela (pē'lä), kind of wax prepared by the Chinese from the secretions which an insect of the cochineal family (*Coccus sinensis*) deposits on the twigs of a species of ash (*Fraxinus chinensis*), called by the Chinese *lah-shoo*, or wax tree.

Pei-ho (pā-hō'), literally "white river," most important river of China N. of the Yellow; rises near the Great Wall, flows in a SE. direction through the province of Chihli, and falls into the Gulf of Pechili at Taku; navigable for more than three fourths of its course.

Peine Forte et Dure (pān fōrt ā dūr), French, "hard and severe penalty," called also PRESS-

ING TO DEATH, formerly, in England, punishment of those who refused to plead or stood mute on their arraignment for felony. The victim was stretched naked on his back and had "iron laid upon him as much as he could bear and more," and he was so kept and fed on bread and stagnant water on alternate days (bread one day and water the next) until he yielded or died. The object in submitting to death by this penalty was not infrequently to avoid the forfeiture of lands consequent on conviction for a felony. This punishment came into use abt. 1400, and is said to have been last employed in 1741. In 1692, at Salem, Mass., Giles Cory, a supposed witch, stood mute on his trial, and was pressed to death. This is believed to be the only instance of the infliction of this penalty in America.

Peipus (pī'pŏs), lake in NW. Russia, 87 m. long, 30 m. broad; communicates with the Gulf of Finland through the Narova; consists of two lakes connected by a narrow strait; the S. lake is sometimes called Lake Pskow, after the city of Pskow, at its SE. extremity.

Peixoto (pā-shō'tō), **Floriano**, 1842–95; Brazilian statesman; b. province of Alagoas; became general; supported Fonseca in the deposition of the emperor, 1889; elected vice president of the republic, 1890; by resignation of Fonseca, 1891, became president for remainder of term, or until November 15, 1894. In 1893 he vetoed a bill intended to prevent his reëlection; this, and the general opposition to a military president, caused much ill feeling. Two rebellions ensued, the second being crushed, 1894. Meanwhile the elections resulted in the return of a civilian, Prudente Moraes, for the succeeding term.

Pe'king, or **Pe'kin** (local, PEICHING, "the N. capital"), capital of China in province of Chihli; near the Hun-ho, tributary of the Pei-ho; 50 m. S. of Great Wall; 85 m. NW. of Gulf of Pechili; area within walls, 24.5 sq. m.; est. pop. abt. 700,000. The city consists of three distinct parts or cities, each with its own walls—*viz.*, the N. Manchu, or Tartar city, within this the Imperial city, and adjacent to it the S., or Chinese city. The first, though called the Tartar city, is now largely occupied by Chinese; the second contains the palaces, and public offices, and temples; the S. city to a great extent consists of open fields, or is occupied by ruins. The Tartar city is a rectangle, about 4 m. N. and S. and 3 m. E. and W. The wall is 30 ft. high, 25 ft. thick at the base, 12 ft. across at the top, and surmounted by a parapet. Square buttresses, surmounted by towers, occur at frequent intervals, and there is always one on each side of each gate. There are nine gates, two for each side, except into the Chinese city to the S., where there are three. The gates are surmounted by small forts.

The Imperial city is guarded by a wall almost as high and elaborate as that of the Tartar city; is about 2 m. long by 1 broad; is entered by three gates, one each on the E. and W., and one on the S. The gates are carefully guarded, and no one is admitted except those having business within. The temples and palaces within are roofed with yellow tiles, and this city is consequently sometimes called the Yellow city. Inside the Yellow city is an inclosure surrounded by a wall and containing the imperial residence. It is tiled with red, and is called the Red or Prohibited city. The S. or Chinese city abuts on the Tartar city on the S. It was originally a suburb, but was later surrounded by a wall, lower than that about the Tartar city. It has ten gates, three of them in common with the Tartar city; is about 6 m. E. and W. and 2½ N. and S.; contains the Temples of Heaven and Agriculture. Outside Peking are temples of the Sun, Moon, and Earth. About 8 m. NW. is an imperial park, called Yuen-ming-yuen, containing about 12 sq. m., and having many pleasure houses; in the environs are many temples, convents, and tombs.

A city has occupied from time immemorial the present site of Peking, or one near by. The Chinese believe that it is the city Ki, known one thousand years before the Christian era. It was restored and reduced in size, 1409, and the part then constructed is the present Tartar city. During the Boxer disturbances of 1900, the foreign legations were destroyed and the representatives of the foreign powers besieged by Boxers and Imperial troops in the compound of the British legation from June 20th to Aug. 14th, when the city was taken by the allied forces. The city was under military control of the powers till the summer of 1901.

In the early part of 1919 the city became seriously disturbed because of the relations between China and Japan growing out of the World War. Fierce rioting occcured, with many outrages against high personages. The revolution divided China into two parts, each with a provisional government. The Southern government representing the greater part of the provinces of Fukien, Hunan, Szechuan, Kuangtung, Kuangsi, Kevelchow, and Yunnan, fought the Peking government for the tranfer of the capital to Hankow.

Pela'gianism, religious system founded by Pelagius, of whom little is known, but he is supposed to have been a British monk, whose real name was Morgan. He went to Rome abt. 409, and with his disciple Cœlestius to Carthage, 411. Pelagius soon left Africa for Palestine, but Cœlestius was accused of heresy before a synod held in Carthage, 412, and condemned for the following doctrines: (1) Adam was created mortal, so that he would have died whether he had sinned or not; (2) Adam's sin injured only himself, and not the human race; (3) newborn infants are in the same condition in which Adam was before his fall; (4) the whole human race neither dies in consequence of Adam's death or transgression, nor rises from the dead in consequence of Christ's resurrection; (5) infants obtain eternal life, though they be not baptized; (6) the law is as good a means of salvation as the gospel; (7) there were some men, even before the appearance of Christ, who did not commit sin. Pelagius himself was soon attacked in Palestine, where Jerome became one of his most zealous opponents. Several synods condemned

the system, although for a time its teachers had the confidence of the pope. Augustine, the most powerful opponent of Pelagius, appealed to Emperor Honorius, 418, who ordered the suppression of the new heresy. The doctrines were again condemned by the Ecumenical Council of Ephesus, 431. The followers of Pelagius never formed a sect properly so called, but Pelagianism long maintained a foothold in the Church.

Pela'gius I, d. 560; pope; b. Rome; succeeded Vigilius, 555; had troubled pontificate, owing to refusal of many bishops to accept decrees of Ecumenical Council at Constantinople, 553; succeeded by John III.

Pelagius II, 520–90; pope; b. Rome; succeeded Benedict I, 578; first independently elected pontiff after the Byzantine conquest of Rome, 536; succeeded by Gregory the Great.

Pelargon'ic Ac'id, member of the fatty acid series; occurs naturally in the volatile oil of rose geranium, *Pelargonium roseum*, whence its name, and is obtainable artificially by several methods, one being the oxidation of essential oil of *Ruta graveolens*, or rue.

Pelargo'nium. See GERANIUM FAMILY.

Pelas'gians, ancient people of S. Europe. Greek writers speak of them as migrating and agricultural tribes. Homer regards them as the aborigines of Greece, and connects them also with Asia Minor and Crete. Thucydides considers them the most numerous of the many kindred races of Greece. They came from the E., passing over from Asia Minor (where they were probably pressed by the Lydians, Phrygians, and Carians) to the islands and the mainland of Greece, and establishing themselves principally in Thessaly, Epirus, and the Peloponnesus. In Italy the S. tribes were of Pelasgic race; and at one time the population of Etruria was also largely Pelasgian. They were skilled in fortification, and in every land which they inhabited their presence can still be traced by works of defense, built of immense polygonal blocks of stone fitted together without mortar or cement. These works are commonly called cyclopean, from their grandeur and antiquity. Their language is by some considered Greek, by others Semitic, and by others Thraco-Illyric.

Pelecan'idæ. See PELICAN.

Pe'leus, in Grecian mythology, son of Æacus, brother of Telamon and father of Achilles by Thetis, daughter of Nereus, and therefore immortal. He was King of Phthia, Thessaly; took part in the Calydonian boar hunt and the Argonautic expedition; at his marriage to Thetis in the cave of the centaur Chiron the gods appeared and brought goodly gifts, only Eris threw among the assembled guests the golden apple inscribed, "To the Fairest," a circumstance which gave rise to the Trojan War, in which the issue of this marriage (Achilles) was to be the leading figure.

Pelew' Is'lands, group of 26 small islands in the Pacific, SE. of the Philippines, at W. extremity of the Caroline archipelago; discovered by Spaniards, 1543; sold by Spain, with the Carolines and all the Marianas (or Ladrones) except Guam to Germany, 1899.

Pel'ican, any one of several water birds of the family *Pelecanidæ*, having all four toes connected by a web, and distinguishable at a glance by their extremely long bill, beneath which is a large skinny pouch. The tail is short, and consists of numerous feathers; wings very long; bones all permeated by air,

BROWN PELICAN.

and numerous air sacs present about the body. Pelicans dwell both on the seacoast and by inland waters in temperate as well as tropical countries. They nest on the ground or on low trees and bushes, and lay from one to three eggs, like chalk in appearance. There are ten or twelve species. The white pelican of N. America (*P. trachyrhynchus*), a bird of the size of the common pelican, is found on the Gulf coast and extends inland to Great Salt Lake. The brown pelican of N. America (*P. fuscus*) extends along the coast of the U. S. from N. Carolina to Texas, and a similar species (*P. californicus*) occurs on the Pacific coast.

Peli'des. See ACHILLES.

Pelig'ni, ancient warlike people of central Italy, of Sabine origin, who occupied a very small territory between the Marrucini, the Marsi, Samnium, and the Frentani. They long warred against the Romans, but having concluded peace with them about the end of the fourth century B.C., they aided them against the Samnites and Hannibal. They played a principal part in the Social War, and were finally subdued, 89 B.C.

Pe'lion, in ancient geography, a mountain range of Thessaly, extending along the coast of Magnesia, on the E. rising precipitously from the sea, and on the N. connected by a low ridge with Mt. Ossa. In their war with the gods the giants are said to have attempted to scale Heaven by piling Pelion and Ossa on Olympus, or Ossa and Olympus on Pelion.

Pelissier (pā-lē-sē-ā'), **Jean Jacques Amable** (Duc de Malakoff), 1794–1864; French marshal; b. near Rouen; entered the artillery, 1814; served in Spain, 1823, in the Morea, 1828, and in Algeria, 1830. Commanding a corps, 1845, he entered the territory of the Ouled Riahs, defeated them, and shut them up in a cave. As they refused to surrender, he applied burning fagots to the mouth of the cave, and about 600 Arabs were suffocated. This atrocity excited general indignation, and he was saved only by the declaration of Marshal Bugeaud, commander in chief in Algeria, that he had simply obeyed a positive order. In 1855 he was commander in chief of the army in the Crimea, and took the Malakoff.

Pel'la, ancient capital of Macedonia and birthplace of Alexander the Great; large and magnificent city in the days of Philip and Alexander, but lost its importance under the Romans, and disappeared altogether during the Middle Ages.

Pel'lagra, a disease characterized by gastro-intestinal, cerebro-spinal, and cutaneous symptoms, of which a peculiar skin eruption is the most pronounced. It is prevalent in Italy, Spain and other parts of Europe, and has recently developed to an alarming extent in the U. S. Between 1907 and 1911 pellagra was discovered in 31 states, and in this period at least 25,000 cases occurred. The disease is apt to run a chronic course, with periodic remissions, and in some cases it causes profound paralytic and mental disturbances. The cause of the disease is still entirely unknown.

Pel'lico, Silvio, 1789–1834; Italian author; b. Saluzzo; became Prof. of French in a college at Milan, 1810; wrote the tragedies "Laodicea" and "Francesca di Rimini," the latter of which, acted 1819, was a great success; aided in establishing the literary periodical *Il Conciliatore*, which was later suppressed by the Austrian administration. He was arrested, 1820, and after confinement at Milan and Venice, was, 1822, condemned to death on a false charge of Carbonarism. The emperor commuted the sentence to fifteen years' confinement. In 1830 Pellico was released, and the rest of his life was passed in retirement at Turin. Other works, "My Prisons" and "On the Duties of Man."

Pelop'idas, d. 364 B.C.; Theban general; expelled, 382 B.C., from his native city by an oligarchic party supported by Sparta; returned, 379 B.C., slew the Spartan leader with his own hand, established a thoroughly democratic government, and broke the Spartan influence not only in Thebes, but in Greece. He distinguished himself in battle of Leuctra, 371 B.C., and on a diplomatic mission to Susa baffled the Spartan and Athenian intrigues at the Persian court, and Thebes was acknowledged as the first city of Greece. Sent, 368 B.C., as ambassador to Alexander of Pheræ, he was seized and imprisoned by the tyrant, but rescued by Epaminondas; 364 B.C., defeated Alexander at Cynoscephalæ in Thessaly, but was killed while pursuing the enemy.

Peloponne'sus, ancient name for the S. division of Greece, the peninsula, now generally called the Morea; was divided into six districts or states: Achaia, in the N.; Argolis, in the E.; Laconia, in the SE.; Messenia, in the SW.; Elis, in the W.; and Arcadia in the middle. See GREECE.

Pe'lops, in Grecian mythology, son of Tantalus (King of Phrygia), brother of Niobe and father of Atreus and Thyestes; married Hippodamia, daughter of King Œnomaus of Elis; became king after the death of his father-in-law; renewed the Olympian games, and gave his name to the S. division of Greece by sending a colony thither.

Pelu'sium (prob. anc. *Abaris* or *Avaris*), Egyptian fortified city and outpost near the Mediterranean, on the Pelusiac branch of the Nile. Its history cannot be traced except in the geographical lists on temple walls, since the present remains are very few and much weather-beaten. Avaris was the final stronghold of the Hyksos, from which they were driven by Ahmes I. It was also the scene of the overthrow of the native dynasty under Psammetichus III by Cambyses. At present the site is nearly level with the surrounding marsh.

Pel'vis (Latin, "basin"), lowest of the three great divisions of the trunk, or the bony ring or framework, connecting the column of the spine with the lower extremities, and transferring the weight of the former to the latter. It consists of four bones. The front and sides are formed by the two *ossa innominata*, large irregular bones which have received their name from their not resembling any other body in form; behind, the circle is completed by the *sacrum* and *coccyx*. The pelvis varies somewhat in the male and female skeleton, and also in the skeletons of different races.

Pem'berton, John Clifford, 1814–81; American military officer; b. Philadelphia, Pa.; graduated at West Point and entered the artillery, 1837; served in Seminole War in Florida; distinguished himself in Mexican War; became lieutenant general in the Confederate army; defended Vicksburg against assault, but forced by siege to surrender, July 4, 1863.

Pem'mican, concentrated food, originally made by the N. American Indians by drying and powdering the lean meat of the buffalo or deer, mixing it with service berries, stirring all into boiling fat, and making it into cakes. The name is also given to a form of meat biscuit used by Arctic voyagers.

Pemphigus (pĕm-fī'gŭs), skin disease characterized by successive crops of blisters. Two varieties are described: *Pemphigus vulgaris*, which may be acute or chronic, and *P. foliaceus*, which is always chronic. Pemphigus often comes on suddenly, with chills and fever and great constitutional depression. It may be epidemic in certain localities, especially in the newborn. The acute form lasts two to six weeks; the chronic from six months to a year or more. The treatment consists in arsenic and remedies to restore the general tone, such

as strychnine, quinine, and iron. Local treatment with dusting powders gives relief, and in severe cases patients have been kept in continuous warm baths.

Pen, instrument for writing with a fluid. Pens of reed were made at a very early period for the use of a fluid ink on papyrus. The introduction of paper rendered finer pens necessary, and quills of the goose and swan next came into use, and for extremely fine writing those of other birds, as of the crow. In a single year St. Petersburg furnished to England over 27,000,000 quills. Germany and the Netherlands were also large producers of goose quills. In 1803 Mr. Wise, of Great Britain, produced pens of steel of barrel form, mounted in a bone case for carrying in the pocket. These were expensive and little used. Gillott, of Birmingham, began the manufacture abt. 1820, and introduced great improvements in the steel pen, making it of thinner and more elastic steel, and of higher finish and temper. Many unsuccessful attempts were made in the U. S. to compete with the English manufacturers, but now large quantities are made of best quality. The manufacture of pens of elastic material furnished with durable points of some extremely hard substance began in England with attempts to secure bits of metal to pens made of glass, tortoise shell, and horn. This finally led to the production of gold pens, the manufacture of which is carried to the highest perfection in New York City. Iridium and osmium alloy points to pens were introduced by Dr. Wollaston; but to Levi Brown, a watchmaker of Detroit, the credit is due of making practical their application to gold pens. His first attempts, abt. 1835, were unsuccessful, but after removing to New York City, 1840, he succeeded in introducing good iridium-pointed gold pens. There are many patents for fountain pens, which were invented in the U. S. The principle involved is the retention of the ink by atmospheric pressure and the furnishing of a supply ready for use for hours of continuous writing without the necessity of dipping constantly into an ink well.

Pen'alty, imposition of payment of money or of some personal suffering; imposed by law, as in criminal or punitive cases, or by contract. The U. S. Constitution forbids the imposition of excessive fines or pecuniary penalties and the infliction of cruel and unusual punishments by the Federal Government. In the absence of constitutional restraint the infliction of penalties and the disposition of the proceeds are matters of legislative discretion. A statutory penalty must be clearly imposed; it will not be implied. The legislative imposition of a penalty on a specific act or omission is treated generally as equivalent to its prohibition. It may appear, however, from the entire statute that the legislature intended not to render the act or omission absolutely illegal, but to punish the offending party.

Pen'ance, penalty accepted or self-imposed by way of satisfaction and token of sorrow for sin. In the early Christian Church penances were of three sorts, secret, public, and solemn. During the term of penance expressions of joy were to be laid aside, gay dresses put off, and marriage, feasting, bathing, and various bodily gratifications abstained from. The men were to cut their hair and beards, and the women to appear with disheveled locks. The penitents were also expected to abound in good works, and be present, as far as it was permitted them, at every religious assembly. In the Eastern Church, the ceremonies of solemn penance were retained until about the close of the fourth century, and in the Western Church until near the end of the seventh. It gradually became customary for the bishops to commute the canonical penances for pious works more agreeable to the spirit of the age, such as pilgrimages, works of charity, and alms deeds, and these in turn were exchanged for indulgences. In the Roman Catholic and Eastern churches penance is one of the seven sacraments instituted for the remission of post-baptismal sins. The authority to absolve has been found in Matt. xviii, 18, and John xx, 23.

Penang', island in Strait of Malacca, forming part of the Straits Settlements; area, 107 sq. m.; ground mountainous; soil is fertile, and adapted to the cultivation of pepper, cloves, nutmegs, and other spices, which are largely exported. Sugar, coffee, indigo, and cotton are also raised, and tin is one of the chief exports. Pop. (1901) 248,207.

Penates (pē-nā'tēz), in Roman mythology, the gods of the household, originally the guardians of the storeroom, *i.e.*, those who care for the daily bread of the family. They were gods of the hearth, and were worshiped by offerings of food and drink at the daily meals in a manner similar to the worship of the Lares.

Pen'cil, name applied to instruments of various forms and material for writing, drawing, and painting. The first form of pencil is supposed to have been made of earth or chalk, and used by the early Greeks and Egyptians in monochromatic pictures. As early as the fourth century B.C. wet colors were used by the Greeks, and applied with a small pointed brush, called a pencil. Such pencils are made of the hairs of the camel, badger, sable, mink, polecat, and goat, and the bristles of hogs. The finer hairs, as those of the sable, are exclusively used by artists. The hairs, selected and arranged with their points in the form of an acute cone, are bound with a thread and drawn through a goose quill, or a conical tin or silver tube, to which a wooden handle is fixed. Ancient writers mention the use of lead for ruling on papyrus, as well as documents ruled with graphite, and probably fragments of different colored minerals were used previous to all historic mention. Even as late as the nineteenth century pencils made of soft lead hammered into convenient forms were used and known as "plummets." Lead pencils, so called because made of graphite, black lead, or plumbago, are among the most widely distributed manufactures. In the sixteenth century a mine of very pure graphite was discovered in Cumberland, England, and became famous as the Borrowdale mine. The graphite

was so soft and pure that it was readily sawed into thin strips, which were glued into slabs of wood, properly grooved, and then sawed into pencils. After the exhaustion of the Borrowdale mine powdered graphite mixed with clay was used. This method was the invention of the Comte de Paris. The mixture of graphite and clay while in the soft state was placed in grooved wood, and, after hardening, a thin veneer of wood was glued on and the slabs sawed into pencil form.

The present practice is briefly as follows: Powdered graphite freed from all grit and impurities is mixed with clay, the quantity of clay depending upon the degree of hardness required. The harder leads can be made in smaller diameter than the soft leads. The mass, made thoroughly homogeneous, is then spun through dies by pressure, and the leads cut into lengths desired. Afterwards the leads are baked to make them strong, and then placed in grooved cedar slabs. The slabs are formed by machinery into pencils and finished into various styles. Red, blue, and other colored leads are made of colored pigments and wax. They cannot be subjected to the toughening process of baking on account of the nature of the materials, but in other respects the method of manufacture is the same.

Lead pencils are manufactured in France, Bavaria, Austria, and the U. S. The wood used is obtained chiefly from the forests of Bohemia and Florida.

Penden'tive, piece of masonry which supports a cupola or dome, and rests in its turn on arches below. Each pendentive is somewhat triangular in shape, for it is bounded on each side by the curving extrados of an arch, and at top by the lowest ring of the cupola.

Pen'dleton, Edmund, 1721–1803; American statesman; b. Caroline Co., Va.; admitted to the bar when twenty-one; leader and several times Speaker of Virginia Legislature; political antagonist of Patrick Henry; drew up resolutions by which Virginia instructed her delegates to propose the Declaration of Independence.

Pendulum (pĕn'dū-lŭm), suspended body oscillating under the action of gravity. A rod or string with a ball or disk attached to its lower extremity is the ordinary form of a simple pendulum, and the simplest form under which the peculiarities of its motion can be studied. The condition that the pendulum should be in stable equilibrium is that the center of oscillation should be vertically below the center of suspension. When this condition is fulfilled, a displacement of the suspended body to either side will call into play a force tending to bring it back again, and if this force is permitted to act without restraint the pendulum will return to its mean position and continue to oscillate about it. The most important practical applications of the pendulum are to the regulation of timepieces, and, in its horizontal form, to the measurement of very weak attractive or repulsive forces, of slight changes of level, and of minute variations in the dimensions of solid bodies.

Penelope (pē-nĕl'ō-pē), in Greek mythology, daughter of Icarius, wife of Ulysses, and mother of Telemachus. While Ulysses was at the siege of Troy, or wandering on his return, she was surrounded by importunate suitors, whom she put off by declaring that she must first finish a shroud which she was weaving for her father-in-law, Laërtes, and by unraveling each night what she had done during the day. Returning after twenty years, Ulysses slew all the suitors.

Pen'guin, popular name for group of birds peculiar to the S. hemisphere, incapable of flight, and having wings modified as swimming paddles. The body and wings are evenly covered with short, scalelike feathers, feet stout and but little used in swimming. These birds

Great King Penguin.

sit erect, and in this attitude walk, or rather waddle. There are about a dozen species, ranging in size from the great king penguin (*Aptenodytes forsteri*), which is over 3 ft. in length, to the little *Eudyptila minor*, which is about half that length. The Falkland Islands appear to be their center of distribution, half the known species occurring there.

Penin'sular War, a war caused by the intrigues and ambition of Napoleon, who, 1807, wished to separate Portugal and place his brother Joseph upon the throne of Spain. The whole peninsula was occupied by French troops, and the Spanish and Portuguese peoples, joined by the English in 1808, rose in defense of their liberties, and waged a fierce guerrilla warfare against the invaders, resulting in the retreat of Sir John Moore to Coruña, and his death there; the accession of Sir Arthur Wellesley (afterwards Duke of Wellington) to the supreme command; his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal; and his subsequent victorious march through Spain, marked by the great battles of Salamanca (1812) and Vittoria (1813). In the spring of 1814 the tide of war rolled through the passes of the Pyrenees into the S.

of France, where this great struggle was concluded by the final overthrow of Napoleon at Toulouse.

Peniten'tiaries. See PRISON.

Penn, William, 1644–1718; founder of State of Pennsylvania; b. London; son of Sir William Penn, an English admiral; entered Christ Church College, Oxford, and, on being converted to Quakerism, was expelled; while managing family estates in Cork Co., Ireland, was imprisoned for attending a Quaker meeting; on release, returned to London and preached and worked for the society he had joined till thrown into the Tower, when the Duke of York secured his freedom. Inheriting all his father's property, he continued preaching; was again imprisoned, 1671; for refusing to take an oath at his trial was sent to Newgate for six months. From his father he had inherited a claim on the government for £16,000. In settlement the government granted him the present State of Pennsylvania, with right to found a colony or society, with such laws and institutions as expressed his views and principles, and, 1682, made his first visit to America. He returned to England toward the close of the reign of Charles II, intent on bettering the social position of the Quakers in that kingdom, in which plan he partly succeeded. During the reign of James II his connection with the court became very intimate. After the overthrow of James he was twice accused of entertaining treasonable communications with the exiled king, and an order of council, 1692, deprived him of his title to the Pennsylvania government. After a most searching trial, he was fully acquitted, 1693, and another order of council restored his title to him, 1694. He went, 1699, for the second time, to Pennsylvania (Philadelphia), where he stayed till 1701. The mismanagement and villainy of his agent had brought him to the verge of bankruptcy. He was even thrown into the Fleet for some time, 1708. These vexations affected his health; he was struck with apoplexy, 1712, and, although he recovered, his mental faculties were greatly impaired after that time. While imprisoned in the Tower he wrote "No Cross, No Crown," and "Innocency with Her Open Face," and while in Newgate his celebrated plea for toleration, "The Great Cause of Liberty of Conscience."

Pennsylva'nia (name compounded of Sylvania, "forest country," and the surname Penn), popular name, KEYSTONE STATE; state flower, golden-rod; state in the N. Atlantic division of the American union; bounded N. by Lake Erie and New York State, E. by Chautauqua and Delaware cos., N. Y., and the Delaware River; S. by Delaware, Maryland, and West Virginia; W. by W. Virginia, Ohio, and Lake Erie; extreme length, E. to W., 302 m.; extreme breadth, 175.6 m.; area, 45,126 sq. m.; pop. (1910) 7,665,111; capital, Harrisburg; principal cities and towns, Philadelphia, Pittsburg, Allegheny, Scranton, Reading, Erie, Wilkes-Barre, Lancaster, Altoona, Johnstown, Allentown, McKeesport, Chester, York, Williamsport, Newcastle, Easton, Morristown, Shenandoah, Shamokin, Lebanon, Pottsville, Braddock, Bradford. There are considerable differences in the climate of different portions of the state; mean annual temperature, 52° in the SE. counties, 48° in the central counties, 44° in the N. and NW.; rainfall usually greatest in the SE.

The surface falls into three divisions—*viz.*: (1) The section extending from Delaware River to the Blue or Kittatinny Mountains; near the river a narrow plain of level land, but a few miles inland a rolling or undulating tract, with gently rounded hills. (2) The

mountain district adjoining this, which crosses the state in a belt varying in width from 75 to 160 m., and trending from NE. to SW. All the mountain chains which go to make up the Appalachian system are here in their full breadth, though not attaining a great altitude. The mountains of the Appalachian system in the state, aside from their general division into two great ranges—the Blue or Kittatinny and the Alleghany range—are subdivided into a host of minor chains, intersected by numerous valleys, broad and fertile, with the precipitous E. face of the Alleghany range overhanging them. (3) The W. table-land, which occupies about half the area of the state, is a broad, rolling plateau, with occasional ranges of hills, but sloping N. and W. toward New York, Lake Erie, and the Ohio to the NW. and W. boundaries of the state. NW. portion has several isolated summits. It is the region of pine and hemlock lands, and furnishes vast amounts of lumber to Eastern markets. There are six distinct water basins, which, with their tributaries, drain the entire state—*viz.*: the Delaware and its affluents, the Susquehanna and its tributaries, the Genesee, the Potomac, Lake Erie, and the Ohio, with its large and numerous affluents. The Ohio is formed by the union of two large rivers, the Allegheny and Monongahela, at Pittsburg. Both have numerous tributaries. The Monongahela receives the Youghiogheny and several smaller streams. Aside from Lake Erie there are no lakes of importance. There are several islands in the Delaware and two or three in Lake Erie belonging to Pennsylvania.

Gold, silver, copper, tin, and sulphur in a native state have been discovered in Pennsylvania, but none in quantities to make their working profitable. Iron does not exist in a

native state, but the iron ores embrace every known ore and many not found elsewhere. The most valuable mineral, economically, is coal, bituminous and anthracite. Other products include petroleum, natural gas, clays of many kinds, glass sand, building stones, white marble, slate, corundum, and salt (obtained by evaporation). There are numerous mineral springs, some of them of great medical value. Of the minerals possessing only scientific value the number is very great, embracing almost every mineral of note in the largest catalogues. E. of the Alleghanies the coal measures are limited to the few deep, long, usually disconnected, but closely parallel anthracite basins E. of the Susquehanna and to one semi-bituminous coal area occupying the high Broad Top Mountains, S. of the Juniata River. The summit of the Alleghany Mountains is the E. margin of the great bituminous coal field. The coal formation overspreads the whole part of the state, except the NW. corner. Value of mineral products, 1910, $646,857,172, including anthracite coal, $160,275,302; bituminous, $153,029,510; pig iron, $180,695,338; coke, $155,254,599; natural gas, $21,057,211; petroleum, $11,908,914; Portland cement, $19,551,268.

Soil of the valleys and plains generally fertile, and some of it very rich, yielding large crops for a succession of years. There is a large area in forests. Production of principal crops, 1911: Corn, 63,858,000 bu.; wheat, 17,402,000 bu.; oats, 31,724,000 bu.; barley, rye, potatoes, hay, and tobacco, 65,320,000 lb.; wool clip (1911), 2,197,000 lb. of scoured wool, valued at $1,010,620; value of live stock, $150,850,000. Dairying, fruit and vegetable growing, bee culture, and the production of maple sugar and molasses are important industries. "Factory-system" plants, 1909, 27,563; capital invested, $2,749,006,000; value products, $2,626,742,000. The manufacture of iron and steel is the most important industry. The active establishments, 1909, numbered nearly 300 and their capital exceeded $500,000,000. Leading articles, besides iron and steel, are foundry and machine-shop products, leather, flour and grist, refined sugar and molasses, refined petroleum, cotton goods, carpets, hosiery and knit goods, woolen goods, worsted goods, silk and silk goods. Ports of entry, Philadelphia, Pittsburgh and Erie; value imports into Philadelphia for year 1910-1, $83,626,647; exports, $69,956,380.

Thirty-four colleges and universities include Univ. of Pennsylvania (nonsectarian), Philadelphia; Lafayette College (Presbyterian), Easton; Western Univ. of Pennsylvania (nonsectrian), Allegheny; Lehigh Univ., S. Bethlehem; Bucknell Univ. (Baptist), Lewisburg; Haverford College (Friends), Haverford; Dickinson College (Methodist Episcopal), Carlisle; Swarthmore College (Friends), Swarthmore; La Salle College (Roman Catholic), Philadelphia; Washington and Jefferson College (nonsectarian), Washington; Lincoln Univ. (for colored youth), Lincoln, University Station; Franklin and Marshall College (Reformed in U. S.), Lancaster; Bryn Mawr College (for women), Bryn Mawr.

The first settlement within the bounds of Pennsylvania was at Tinicum Island by Swedish colonists, under John Printz's administration. In 1655 the Dutch from New Amsterdam marched on these settlements and took formal possession of the country. In 1660 a Dutch settlement was planted at the Minisinks, the settlers being colonists from New Amsterdam. When the English captured New Amsterdam, 1664, the colony on the Delaware followed its fortunes and remained under the government of New York (except for a part of 1673–74, when the Dutch recaptured it) until March 4, 1681, when Charles II granted to William Penn the "tract of land in America lying N. of Maryland, on the E. bounded with Delaware River, on the W. limited as Maryland, and N. to extend as far as plantable." Penn landed at New Castle (now in Delaware), October 27 (O S.), 1682. During 1683 he organized his new government and provided places for the many immigrants (mostly Friends) who began to flock thither. He returned to England, 1684, for the settlement of the boundary between Pennsylvania and Maryland. In 1699 he again visited his province, remaining till 1701, and gave the colonists a new constitution and Philadelphia a charter. From this time to 1720 emigration to Pennsylvania constantly increased. Penn died 1718, and his heirs succeeded him as proprietaries. The boundary between Pennsylvania and Maryland was run 1766–67 by Charles Mason and Jeremiah Dixon. In 1768, by a treaty with the Six Nations, a large tract of land, called the New Purchase, embracing most of the counties of N. and NW. Pennsylvania, was conveyed to the proprietaries, and at once induced an enlarged immigration. The massacre of the Wyoming settlers by British soldiers, Tories, and Indians occurred July, 1778, and was summarily avenged by the McIntosh and Sullivan expeditions.

In 1778 the royal charter was annulled, and the Penns were allowed £130,000 for their settled lands in the state. Pennsylvania furnished more than her full quota of troops for the Revolutionary War. Slavery was abolished 1780. The "Whisky Insurrection" in the W. counties occurred 1794; occasioned great excitement, but was put down without bloodshed. A less considerable insurrection was attempted four years later, but was promptly suppressed. In 1799 the state capital was removed to Lancaster and, 1812, to Harrisburg. After the War of 1812 the state was largely engaged in colossal enterprises of internal improvement—canals and railways—which for some years embarrassed her finances. In 1859 the petroleum discoveries were made. The state was three times invaded by the Confederates—first, October 10, 1862, when Chambersburg was captured and military stores burned; second, by Gen. Lee, when the battle of Gettysburg was fought on her territory; third, in July, 1864, when Chambersburg was burned. The state furnished nearly 400,000 soldiers for the Civil War.

Pennsylvania Dutch (properly GERMAN), S. German dialect due to fusion of forms in

Rhenish Bavaria, Baden, Darmstadt, Würtemberg, German Switzerland, and Alsace, and taking up in the U. S., chiefly in Pennsylvania, an English element.

Pennsylvania, Univer'sity of, nonsectarian institution in Philadelphia; coeducational in law, graduate school, and biology classes; founded, 1740, as a charity school; made college 1755, university (first in U. S.) 1779; medical department (oldest in America) opened 1765, law 1789. The institution embraces courses in arts and science; Towne Scientific School, with courses in civil, mechanical, and electrical engineering, chemistry, etc.; School of Architecture, School of Biology, School of American History, and Wharton School of Finance and Economy. Closely connected with the department of medicine are the University Hospital, auxiliary department of medicine, which makes provision for advanced study in medical science, and Wistar Institute of Anatomy and Biology. The Dental School is thoroughly equipped, the students using, with the medical students, the largest chemical instruction laboratory building in the world. The veterinary department occupies four buildings erected for its use, two of these being devoted to the Veterinary Hospital. The department of hygiene has ample facilities for the study of hygiene and bacteriology and for special research. The university had (1909) over 450 professors and instructors, 4,126 students in all departments, and about 294,000 volumes in libraries.

Pen'ny, English coin, first mentioned in the laws of Ina, King of Wessex, abt. 695 A.D. It was at first of silver; weighed 22½ grs. Troy, but value and weight declined. The first copper pence were introduced 1797. The British penny is now of bronze. It is the twelfth part of a shilling, and is designated by the letter *d.*

Pennyroy'al, fragrant labiate herb of the Old World (*Mentha pulegium*) growing wild or cultivated in gardens; used in medicine as a stimulant and carminative. In the U. S. the name is given to *Hedeomapulegioides* (low pennyroyal) and *M. canadensis* (high pennyroyal), both having very nearly the odor of the English pennyroyal.

American Pennyroyal.

Penob'scot Bay, inlet of the Atlantic penetrating the coast of Maine for 30 m.; abounds in islands and good harbors; principal tributary, Penobscot River.

Penobscot Riv'er, chief river of Maine and most important navigable stream in New England; rises in Somerset Co., near the Canada line; flows E. into Chesuncook Lake, thence SE. to its union with the Mattawamkeag, having 12 m. above united with the Seboois or E. branch; thence S. by W. to Penobscot Bay; length, 300 m.; navigable for large ships to Bangor, 60 m.; upper waters afford valuable motive power, and great numbers of logs are floated from the forests to Bangor.

Penob'scots and **Passamaquod'dies,** members of two small tribes of N. American Indians, belonging to the Algonquin stock; aided the colonists during the Revolution; the former settled on Indian Island, opposite Oldtown, Me.; the latter on Denis Island and Pleasant Point, Passamaquoddy Bay, and on the Schoodic lakes.

Penol'ogy. See Prison.

Pensaco'la, capital of Escambia Co., Fla.; on Pensacola Bay; 6 m. N. of the Gulf of Mexico, 48 m. E. of Mobile. It has an excellent landlocked harbor, with from 31 to 33 ft. of water on the bar; was of much importance during the Spanish and English government of Florida; is site of a U. S. navy yard, of forts Pensacola, McRee, Barrancas, and Pickens, and of the ruins of the old Spanish forts San Miguel and San Bernardo. It has a large foreign and domestic trade in lumber, timber, shingles, phosphate, cotton, fresh fish, and coal. Pop. (1910) 22,982.

Pensacola Bay, inlet of Gulf of Mexico; at the W. extremity of Florida, extending inland NE. about 35 m., affording a deep, capacious, and commodious harbor; is divided into Escambia Bay on the W. and the Bay of Santa Maria de Galvez on the E., and receives Escambia, Black Water, and Yellow Water rivers; entrance, 1 m. wide between Santa Rosa Island, on the E. defended by Fort Pickens, and the entrance point of the mainland on the W., on which stands Fort McRae.

Pen'sion, allowance of money, generally in fixed amounts and annual payments, made by the government to certain individuals or to their families and representatives, in consideration of some public services performed or supposed to have been performed by them. In Great Britain, besides large sums devoted to pensioning army and navy men, pensions are conferred on judges of the higher courts and on many other civil officers who have performed their duties for a specified number of years and then resigned. They are also granted to distinguished and meritorious authors, artists, scientific men, inventors, and the like, or to their widows or families, for the purpose of rewarding personal merit and of encouraging literature, art, and science. The policy of the U. S. Govt. has confined the bestowment of pensions to the officers and privates who have served in the army or navy during the wars in which the Republic has been engaged. They are allowed for twenty years' and ten years' service, respectively, in the navy or marine corps, but the bulk of the pensions are "invalid pensions" to those incapacitated through wounds or disease contracted during the Civil War. Pensions are also granted to the widows, minor children and dependent parents or minor brothers and sisters of such soldiers.

The pensions are graded. In cases of total blindness, loss of both feet or hands, incapacity requiring the attention of others, $72 a month is allowed. Veterans incapacitated for manual labor, or considered permanently disabled within the meaning of the pension laws and by Acts of Congress of February 6, 1907, and May 11, 1912, all veterans over sixty-two years old who served 90 days or more in the Civil War or 60 days in the war with Mexico are entitled to receive pensions varying with their ages and lengths of service.

The following amounts have been paid to soldiers, their widows, minor children, and dependent relatives on account of military and naval service during the wars in which the U. S. has been engaged (to June 30, 1918):

War of the Revolution (estimated)	$70,000,000.00
War of 1812 (on account of service)	46,031,563.82
Indian wars (on account of a service)	15,144,212.92
War with Mexico (on account of service	52,148,138.86
Civil War	5,087,647,618.63
War with Spain	61,333,476.58
Regular establishment	46,540,408.16
War of 1917	7,243.31
Unclassified	16,508,447.41
Actual disbursements in pensions	$5,395,361,109.69

Year Ended June 30th.	Number of Pensioners on the Rolls.	Total Disbursements for Pensions
1864	51,135	$4,504,616.92
1870	198,686	29,351,488.78
1880	250,802	56,689,229.08
1890	537,944	106,093,850.39
1900	933,529	138,462,130.65
1910	921,083	159,974,056.08
1911	892,098	157,325,160.35
1918	646,895	179,835,328.75

Pension, Old Age, pension given by governments either to all men and women who have passed the old-age limit or to certain classes. In Germany and Denmark the weekly wages of every workman in a large manufacturing establishment are charged with a small percentage from which is to be made the provision for his old age. The percentage is paid into the state treasury. In New Zealand every person, not an alien or an Asiatic, who fulfills certain conditions is entitled to a pension of £26 a year, after reaching the old-age limit. A system modeled on the New Zealand law was adopted in Australia, 1908. In the same year Great Britain inaugurated a system of pensions for British subjects over seventy years of age for twenty years resident in the United Kingdom whose yearly incomes do not exceed £31 10s. A commission appointed by the U. S. Congress reported, 1907, a project for providing for the age retirement of 100,000 classified clerks in the Federal service throughout the country. Their plan provided for deducting from the salary of each employée an amount sufficient to purchase his own insurance or annuity on reaching the age of seventy, the deduction to be made monthly and the Government to act as custodian of the fund.

Pentateuch (pĕn'tă-tūk), collective name of the first five books of the Old Testament—Genesis, Exodus, Leviticus, Numbers, and Deuteronomy; originated from the Greek translators and Fathers; Jews called this division of their sacred book *Torah*, the Law; these and Book of Joshua form the Hexateuch.

Pen'tecost, one of the three principal festivals of the Jews, celebrated on the fiftieth day after the 16th Nisan, second day of the Passover (Lev. xxiii, 15, 16), whence the name; originally called the "Feast of Weeks" (took place at the beginning of harvest time, hence also its other name, "Feast of Harvest"); characterized by the offering, as "first fruits," of two loaves of leavened bread made from new grain; was a period of liberality to the poor. In modern times the Jewish festival lasts two days. In Christian churches the word has a different meaning, derived from the occurrences related in Acts ii—*viz.*, the descent of Holy Spirit on the infant Church ten days after the Ascension, the gift of tongues, and the conversion of 3,000 persons. In the English Church, Pentecost is known as Whitsunday or Whitsuntide.

Pent'land Firth, channel connecting the Atlantic with the German Ocean; separating the Orkney Islands from Scotland; 17 m. long, 6 to 8 m. broad; annually traversed by about 4,000 vessels, though difficult to navigate.

Penuchle (pē'nŭk-'l), or **Pin'ocle,** game of cards played by two, three, or four persons with two euchre decks; object, to score 1,000 points. The schedule of "points" of "melds" is as follows:

Two queens of spades and two jacks of diamonds (double penuchle) count	300
Ace, ten, king, queen, and jack of trumps	150
Four aces of different suits	100
Four kings of different suits	80
Four queens of different suits	60
Four jacks of different suits	40
Queen of spades and jack of diamonds (penuchle)	40
King and queen of trumps (royal marriage)	40
King and queen of a suit not trumps (marriage)	20
Nine spot of trumps	10

The relative value of the cards is: ace and ten spot count ten points each; kings and queens, five each; jacks and nine spots, nothing. The last trick counts ten points for the player who takes it. Four-handed penuchle is usually played as a game of partners. The cards are all dealt out, four at a time, each player receiving twelve, and the last card is turned up for trump. If a nine is turned up the dealer is credited at once with ten points; if any other card is turned up, any of the other players who holds a nine of trumps may exchange it for the trump card and claim ten points, the player sitting on the left of the dealer having the preference. Each player then melds whatever he has in his hand and the partners score together. The eldest hand then leads a card for the first trick. In every trick each player must follow suit; if he cannot, he must trump; if neither is possible, he may play any card he pleases; the player who takes the trick leads for the next. When either side reaches 1,000 points, the game is won, and the balance of the hands are void.

Peon (pē'ŏn), day laborer; in Spanish America applied especially to Indian laborers. By

the civil law, under the Spanish colonial system, peons are compelled to work for their employers, if they are in debt to them, until the debt is paid. Many proprietors are said to keep their laborers hopelessly in debt and thus in continual bondage.

Pe'ony, any herb or shrub of the genus *Pæonia*, family *Ranunculaceæ*. The U. S. has but one native species, *P. brownii*, of the Pacific states and British America. It has small purple flowers. The various Old World species are cultivated as ornamental plants. The finest varieties in garden culture belong to *P. officinalis, albifolia, tenuiflora, paradoxa*, etc.

Peo'ple's Par'ty, or **Pop'ulists**, political party in the U. S. whose leading principle is opposition to the control exerted by wealth. Its rise was due to the desire of the National Farmers' Alliance and kindred organizations, representing the industrial masses, for agreement on common political principles and union to secure just legislation. The fact that the Alliance and its sympathizers had made, 1890, energetic contests in many sections, and in Kansas had reduced a Republican plurality of 80,000 to 8,000, carried the legislature (securing a U. S. Senator), and elected five Congressmen out of seven, seemed to justify the organization of a separate political party.

On July 4, 1892, the first national convention of the People's Party met at Omaha, Neb., with 1,347 delegates. A platform was adopted, of which the demands may be thus epitomized: A national legal-tender currency, safe, sound, and flexible, issued by the Government only without the use of banks, direct distribution to the people at a tax not to exceed two per cent per annum, to be provided as set forth in the Alliance subtreasury plan or a better system, and by payments in discharge of obligations for public improvements. Free coinage of sliver and gold at the ratio of 16 to 1. Increase of the circulating medium to $50 per capita. A graduated income tax. Limitation of state and national revenues to the necessary expenses of government economically and honestly administered. Government ownership and operation of railroads, telegraphs, and telephones. That land and natural sources of wealth should not be monopolized for speculation, and alien ownership of land should be prohibited. That land owned by railroads and corporations in excess of needs and land of aliens should be reclaimed by the Government and held for settlers. On this platform James B. Weaver, of Iowa, was nominated for President, and James G. Field, of Virginia, for Vice President. The vote for Weaver was 1,041,028. He carried the states of Colorado, Idaho, Kansas, Nevada, and N. Dakota, receiving twenty-two electoral votes. Five U. S. Senators and eleven Representatives were elected. In 1896 and 1900 the party united with the Democrats in supporting William J. Bryan; in 1908 it supported Thomas E. Watson, and polled 29,100 votes.

Peo'ria, capital of Peoria Co., Ill.; on the Illinois River; 165 m. SW. of Chicago; at foot of expansion of river known as Peoria Lake; has water frontage of about 4 m.; covers an elevated plateau extending back ¾ m. to a bluff rising 120 ft. above tide water. The city is in a corn and coal region; noted for its manufactures of spirits; has an extensive commerce by rail and water with Chicago, St. Louis, and other large centers. Chief manufactures are agricultural implements, distilled liquors, malt liquors, foundry and machine-shop products, bread and bakery products, flour, glucose, chemicals, white lead, automobiles, straw board, and paper. Pop. (1910) 66,950.

Pepe (pā'pĕ), **Guglielmo**, 1783–1855; Italian revolutionist; b. Squillace; served under the Franch; became lieutenant general, 1815; headed the revolt against the King of Naples, 1820–21, by which that monarch was forced to accept the constitution. He was defeated at Rieti, 1821, and fled to London; 1848, returned and commanded the Neapolitan contingent against the Austrians, distinguishing himself by his defense of Venice, 1849. He was the author of "Political and Military Events in Naples in 1820 and 1821" and "History of the Revolutions and Wars in Italy in 1847–49."

Pep'in I, abt. 802–38; King of Aquitania; son of Louis le Débonnaire by his first wife; received from him, 817, the Kingdom of Aquitania, while his youngest brother Louis had Bavaria, and the eldest, Lothaire, was associated in the government of the empire. Pepin twice joined his brothers in rebellion against his father, but finally acknowledged his supremacy.

Pepin II, d. abt. 864; King of Aquitania; eldest son of preceding; though bereft of his inheritance, granted to Charles the Bald, son of Louis le Débonnaire, was nevertheless acknowledged as king by the Aquitanians. In 840 he joined his uncle Lothaire in his contest against Charles, and, 845, obliged the latter to grant him the best part of Aquitania as a fief; but his popularity vanished when he allied himself with the Northmen. He was betrayed into the hands of Charles, 852, escaped 854, and, 857, obliged Charles to grant him lands. In an attempt to take Toulouse at the head of the Northmen, 864, he was captured, and imprisoned at Senlis till death.

Pepin (pé-păn') **le Bref** (French, "the Short"), 714–68; first Carlovingian King of the Franks; son of Charles Martel and father of Charlemagne; became, 741, major-domo of Neustria and Burgundy under Childeric III; 747, succeeded his brother Carloman as major-domo of Austrasia and the Rhine country, including Thuringia and Suabia; 749, defeated the Bavarians, and, 752, was crowned King of the Franks. He conquered Septimania from the Saracens, 752–760; was again crowned, 754; broke the power of the Lombards in Italy, 754–56, and gave the exarchate of Ravenna and the Pentapolis to the Holy See, the origin of the temporal power of the popes; waged war with Guaifar, Duke of Aquitania, 760–68, and in the latter year procured the assassination of his enemy.

Pepin of Hĕristal (hĕr'ĭs-tăl), d. 714; founder of the Carlovingian line of Frankish kings;

grandson of Pepin von Landen, mayor of the palace in Austrasia; became Duke of the Austrasian Franks, 680, and, 687, by the battle of Testry conquered Burgundy and Neustria, and afterwards subdued the Frisians and ravaged Suabia. He never assumed the royal title, but exercised sovereign power in the name of four successive Merovingian *fainéant* kings. Charles Martel was his natural son.

Pepoli (pā'pō-lē), **Gioachino** (Marquis), 1825–81; Italian statesman; b. Bologna; defended Bologna, 1848, against the Austrians; presided, 1859, over the provisional government in the Romagna; became its minister of finance and foreign affairs, Italian Minister of Agriculture and Commerce, and ambassador in St. Petersburg and Vienna. On September 15, 1864, he concluded the convention with Napoleon III for the removal of the Italian capital to Florence, and the discontinuance of the French occupation of Rome.

Pep'per, pungent fruit of a climbing shrub, *Piper nigrum*, native of the forests of Malabar and Travancore, and cultivated in various parts of the East and in the W. Indies. Pepper was known to the ancient Greeks and Romans, two kinds having been described in the fourth century B.C.; and it was at one time much more important than now, it having

PEPPER.

been, before the days of cotton, coffee, and sugar, a principal article in the traffic between Europe and the East. White pepper is the same as the black, it being prepared by removing the outer coating of the fruit. Pepper acts as a stimulant to digestion; while it is regarded as useful in small quantities, large doses are capable of producing inflammation; when applied to the skin it causes reddening, and if the application continues long enough it will blister. The pungent taste of pepper is due to an acid concrete oil or resin, and its odor to a volatile oil.

Pepper Fam'ily. See PIPERACEÆ.

Pep'peridge. See BLACK GUM.

Pep'permint, labiate herb, *Mentha piperita*, native of the Old World, but completely naturalized in the New. This plant and its essential oil are extensively used in confectionery, and in medicine as a carminative and to conceal the flavor of nauseous drugs.

Pep'sin, active ferment of the gastric juice, secreted by the cells lining the peptic glands; possesses the power of converting proteids into peptones in the presence of an acid and heat. Substances called pepsin, usually containing some of the active principle, are often prescribed in dyspepsia, and are usually derived from the stomach of the pig.

Pep'tonized Food, food prepared, through the action of pancreatin on proteid substances, for the purpose of supplanting natural digestion in persons whose digestive apparatus is too feeble to carry out its function properly. This process of peptonization has become an exceedingly important one in dietetics.

Pepys (pēp'is), **Samuel**, 1633–1703; English diarist; b. London; became a Roundhead, but turned Royalist under Monk; held various places in the navy; secretary to the admiralty under James II; imprisoned, 1679–80, for alleged complicity in the popish plot; president Royal Society, 1684–86; imprisoned for a time, 1690, as a Jacobite. Pepy's "Diary," kept in shorthand, 1660–69, gives a valuable insight into the everyday life of the times of the later Stuarts. His "Memoirs of the Royal Navy," "Portugal History," and other writings are of value. He was founder of the Pepysian Library, Magdalene College, Cambridge.

Pe'quods, or **Pequots**, members of a tribe of N. American Indians, belonging to the Mohican family of the Algonquian stock; once occupying a tract of 30 by 15 or 20 m., extending from Niantic River to Wecapaug, R. I.; conquered most of the tribes in Connecticut; made peace with the Narragansetts; became hostile to the English. They were defeated and nearly annihilated by expedition from Hartford, 1637.

Pera (pā'rä). See CONSTANTINOPLE.

Peræa (pē-rē'ä), classical name of Palestine E. of the Jordan; term thus corresponded to the *'eber ha-Yarden* (beyond the Jordan) of the Hebrew Scriptures; but in a narrower sense was applied to that portion which lay between the Jabbok on the N. and the Arnon on the S.

Percep'tion, the act of obtaining knowledge of external objects through or by means of the organs of sense, or of internal states and conditions by means of consciousness or intuition; also the result of such act. As attention underlies perception, the influence of the will upon it is obvious.

A little reflection leads to the conclusion that our perception of the external world is a matter of mental construction. All advance into the region of mind must be through mental states. The characteristic of mind is consciousness, and nothing can enter the domain of mind except through the mediation of consciousness. This is seen in the fact that our

images play in consciousness in such a way as sometimes to deceive us in regard to the external world. Many pathological facts show this. When the eye is deranged the mind is deceived in regard to colors and distances. When we have a cold our taste is impaired. When the hand is amputated, irritation of the nerve ends is still localized in the hand. This amounts to saying that the mental picture, which in every case is necessary to the perception of the object, is impaired or dissipated. The nervous system also intervenes between the mind and the world, and the proper activity of mind in representation depends upon the normal functioning of this system.

The beginning of all life experience in the infant is probably a state of general undifferentiated feeling, with no distinct forms for the different sense, and no perception either of its own body or of things external to it. Probably the muscular sense, with touch, constitutes almost the whole of this experience. But as soon as the power of attention is developed each sense becomes a distinct source of experience somewhat in the following order of development; muscular sense, touch, temperature, light, sound, taste, smell, color. One of the most discussed problems of psychology is the origin of the idea of space. It probably arises from the memory of muscular movements and of resistances experienced in such movements. The delicate and varied movements of the eye also contribute to space perception.

The final factor in perception is the gathering up of all the data of sense, time, and place in the finished objects of the external world. This is sense intuition. It is largely due to association, as is shown again by pathological cases. Injuries to the brain, either accidental (in man) or intended (in animals), may leave the creature with all his senses intact, but with no power to distinguish things, their uses, their nature, their relationships. This faculty probably demands the association in the brain of many centers bound together by the so-called "association fibers." On the side of consciousness it demands healthy and concentrated attention. See APPERCEPTION.

Perch, name originally applied to the species of *Perca* or yellow perches (*P. fluviatilis* of Europe and the related American *P. flavescens*). In the U. S., where the yellow perch is not found, the name is applied to various spiny-rayed fishes.

Per'cy, noted family of England, descended from William de Percy, companion of William the Conqueror, who derived his name from the village of Percy, Normandy. The Barony of Alnwick was acquired by HENRY DE PERCY in the reign of Edward I. His grandson having married into the royal Lancastrian family, HENRY PERCY, father of the celebrated Hotspur, was created Earl of Northumberland, 1377, by Richard II. The first four earls of this family took prominent parts in the wars of the Roses, and all perished in battle or by assassination. The title became extinct, 1537, but was revived, 1557, in favor of THOMAS PERCY, beheaded at York, 1572, for conspiring against Elizabeth. His brother HENRY, eighth earl, was charged with conspiring in favor of Mary, Queen of Scots, and was murdered in the Tower, 1585; HENRY, ninth earl, was imprisoned many years in the Tower for alleged participation in the Gunpowder Plot of 1605. The title having again become extinct, 1670, it was revived, 1749, in favor of SEYMOUR, Duke of Somerset, a grandson of the last earl. His son-in-law, SIR HUGH SMITHSON, took the name of Percy, succeeded by permission of Parliament to the earldom, 1750, and was made first Duke of Northumberland, 1766. His son HUGH (known as Earl Percy) was engaged in the battle of Lexington, succeeded to the dukedom, 1786, and died, 1817. The career of his son ALGERNON PERCY, fourth duke, is given under the title Northumberland, Duke of. ALGERNON GEORGE PERCY, sixth duke (1810–99), succeeded to the title, 1867, and became Lord of the Admiralty, 1858. HENRY ALGERNON GEORGE, b. 1871; son of the seventh duke; represented Kensington in Parliament after 1895; Under Secretary Foreign Affairs after 1903.

Percy, Henry (surnamed HOTSPUR), 1364–1403; son of First Earl of Northumberland; became famous in the wars of France and of the Scottish border; defeated and killed Douglas at Otterburn (Chevy Chase), 1388; joined Henry of Lancaster, 1399, aiding him to obtain the English throne; rewarded with the wardenship of the E. Marches and the gift of the Isle of Man; distinguished at battle of Homildon Hill, 1402; took up arms with his father to place Mortimer, Earl of March, on the throne, and was killed at the battle of Shrewsbury; is immortalized in Shakespeare's "Henry IV."

Perdic'cas, name of several kings of Macedonia—(1) the founder of the dynasty, an Argive, who became king abt. 700 B.C.; (2) PERDICCAS II, reigned 454–13 B.C.; (3) PERDICCAS III, reigned 365–60 B.C.; (4) a prince of the royal blood and general of Alexander the Great. When on his deathbed Alexander gave him his ring, the symbol of the royal power; he held the empire together for a short time by his superior energy and talents, but when it became evident that he himself aspired to the crown, a coalition was formed against him by Antipater, Crateros, and Ptolemy, and on his expedition against Ptolemy he was assassinated, 321 B.C., near Memphis, by his own soldiers.

Pereda (pā-rā'thä), **Jose Maria de,** 1836–1906; Spanish novelist; b. Santander; author of brief pictures of his native region—La Montaña, as it is commonly called in Spain, and its people, including "Tipos y passajes," "Bocetos al temple," and "Tipos trashumantes"; of a story of political intrigue, "Don Gonzalo González de la Gonzalera"; the novel "El sabor de la tierruca," and the stories "Pedro Sánchez," "Nubes de estio," "Idilio vulgar," and other works.

Per'egrine Fal'con. See FALCON.

Pereira (pā-rā'ē-rä), **Jacob Rodriguez,** 1715–80; Spanish instructor of deaf-mutes; removed

from Cadiz to Bordeaux; became famous by his success in teaching deaf-mutes to articulate, especially the son of the French comptroller D'Etavigny, for which Louis XV pensioned him.

Père Lachaise (pār lă-shāz'), cemetery. See PARIS.

Perez (pā'rĕth), **Antonio**, 1541–1611; Spanish courtier; b. Monreal de Ariza; secretary of Charles V and Philip II; became Secretary of State to Philip II, 1567; was chief agent of that monarch in many of his secret crimes, especially in the assassination of Juan de Escovedo, 1578; was tried for that crime, imprisoned, and exiled from court; was again arrested, 1590, when, being put to the torture, confessed the act, but accused the king of complicity; escaped to Aragon; was twice seized by royal command and handed over to the Inquisition, but on both occasions released by the people; escaped to France, 1591; resided in England as secret agent of Henry IV, 1593–95.

Perez Galdos (găl'dōs), **Benito**, 1845– ; Spanish novelist; b. Las Palmas, Canary Islands; settled in Madrid, 1863, and became editor of the periodical *Revista de España*. Author of many historical works dealing either with the period of struggles against Napoleon, or with the agitation of the contest of Spanish liberalism against the tyranny of Ferdinand VII, and including "Trafalgar," "Laragoza," "El Grande Oriente," "El Terror de 1824," "Los Apostólicos"; also of many novels dealing with contemporary life in Spain, including "Doña Perfecta," "El Amigo Manso," "La de Bringas," "Fortunata y Jacinta."

Perfec'tionism, doctrine held by many that it is possible to lead a sinless life. The Roman Catholic view is that the law of God may be and frequently is perfectly obeyed, yet that no man is entirely free from venial sins—*i.e.*, those which do not send the soul to perdition. The commonest Protestant teaching of the subject proceeds from the Methodists, who assert that it is possible to live in complete conformity to God's law; yet not so that one is entirely free from errors and infirmities. There is, however, no inward disposition to sin, and no outward commission of it, so there is what is called "Christian perfection."

Per'fume, the scent arising from odoriferous bodies, and also these bodies themselves. The art of preparing them is called perfumery, and by the French is made to include the compounding of a great variety of articles for toilet use, all of which are scented by the introduction of perfumes. From the most ancient times perfumes of various sorts have been esteemed. It is affirmed that after the destruction of the clove trees by the Dutch in the Island of Ternate, the colony suffered from epidemics unknown before; and in times when the cholera has prevailed in London and Paris, those employed in the perfumery factories have escaped its ravages. The art of perfumery was practiced to an extraordinary extent by the ancient Egyptians, Greeks, and Romans. The odor of perfumes was an offering to the gods, and the apparition of these was always represented as accompanied by an ambrosial fragrance. Perfumes are either of animal or vegetable origin. Of the former, the ambergris from the spermaceti whale, the castor from the common beaver, the civet from the civet cat, and the musk from the musk deer are the most important. Perfumes of vegetable origin include those from gums, such as myrrh and olibanum; from seeds, such as tonquin and vanilla; and from roots, such as orris; also the essential oils of all plants and trees, including those from flowers, as rose oil; from grasses, as lemon-grass oil; from leaves, as bay oil; and from wood, as cedar oil. The gums, roots, and seeds yielding solid perfumes are dried and ground into powder, and then made into incense, pastilles, sachets, and the like.

The oils and volatile odors from plants and flowers are obtained by three principal methods—distillation, enfleurage, and maceration. In distillation the fragrant part of the plant is put into a still, covered with water, and then heated. The oily distillate, called attar or otto, passes over into a receiver, and is then condensed; thus rose leaves, distilled, yield attar of roses and orange flowers attar of neroli. As the attars are all slightly soluble in water, the distillate coming over contains a slight amount of perfume, and is known as rose water, orange water, and the like. Enfleurage is used with flowers in which the odor is more volatile, and depends upon the fact that greasy bodies readily absorb and retain volatile odors which they will again readily yield when brought in contact with alcohol. The flowers are spread upon trays containing grease, or in some cases vaseline, and the spent flowers are replaced by fresh ones until the grease called pomade is considered saturated with the odor. Maceration is similar to the foregoing except that the grease is kept liquid by being heated over a water bath. The resources of modern chemistry have added to the compounds used by the perfumer, and synthetical products such as coumarin, nitrobenzol or false almond, and vanillin now find extensive application.

Per'gamus, or **Pergamum**, ancient city of Mysia, Asia Minor; founded by Greek colonists on the Caïcus River, less than 15 m. from the sea. In the confusion which reigned after the death of Alexander the Great, the city became important as the stronghold of Lysimachus. His governor, Philetærus, made himself independent, and Attalus I, 241–197 B.C., succeeded in establishing a kingdom, of which Pergamus became the capital. The Romans favored this new state as a useful ally against Macedonia and Syria, and at different times Phrygia, Lydia, Pisidia, Lycaonia, and Pamphylia were added to it. Meanwhile the capital became one of the greatest and most magnificent cities of Asia Minor, celebrated for its architectural monuments, its splendid library, its grammar school, its invention of parchment, etc. King Attalus III, 133 B.C. bequeathed his possessions to the Romans, and they made Pergamus the focus of all the great

military and commercial routes of Asia Minor. Under the Byzantine rule it rapidly declined.

Pergolesi, or **Pergolese** (pĕr-gō-lā'sē), **Giovanni Battista,** 1710–36; Italian composer; b. Jesi; settled in Naples, 1726, and won distinction by a "Mass" and a comic intermezzo "La Serva Padrona" ("The Servant Mistress"), written for the New Theater. He was chapelmaster at Loreto, 1734–35, then went to Rome, where his opera "L'Olimpiade" was coldly received. Returning to Loreto, Pergolesi produced the works on which his fame rests, including a "Stabat Mater," a motet, "Dixit Dominus," and a motet, "Salve Regina."

Perian'der. See CORINTH.

Pericardi'tis. See HEART, DISEASES OF THE.

Pericar'dium. See HEART.

Pericles (pĕr'ĭ-klēz), abt. 495–29 B.C.; Greek statesman; b. Athens; son of Xanthippus; descended on the father's side from the Pisistratidæ; served in the army; entered abt. 469 on political career as member of the democratic party; gained popularity by laws for the benefit of the poorer classes; overthrew the aristocratic party, 461; produced the impeachment and banishment of its leader, Cimon, and became the real ruler of the state. On his proposition Cimon was recalled, 454; after the latter's death, 449, the aristocratic party was reorganized by Thucydides and attempts to overthrow Pericles were made. Thucydides was banished by ostracism, and Pericles, now sole master of Athens, aimed to make that city the political center of a united Greece. In this he succeeded, as he did in his efforts to increase the opulence and magnificence of Athens. It was the time of Phidias, Socrates, and Sophocles. The Parthenon, the first Odeon, and the Propylæa were built. Commerce flourished, and many branches of industry were carried to perfection. Pericles warded off the Peloponnesan War by bribery for several years, but at last it became inevitable. With the death of Pericles the decline of Athens began.

Per'idot. See CHRYSOLITE.

Per'idotite, group of basic, ferro-magnesian, igneous rocks, free from feldspar, and having as their essential constituent the mineral olivine. Peridotites are subdivided according to the minerals which they contain beside olivine as follows: *picrite* (+ augite), *harzburgite* (+ enstatite), *buchnerite* (+ augite + enstatite), *wehrlite* (+ diallage), *lherzolite* (+ diallage + enstatite), *cortlandtite* (+ enstatite + hornblende), *scyelite* (+ biotite), *dunite* (+ chromite). Another group of ferro-magnesian rocks closely allied to the peridotites is called by the collective name *pyroxenite.* They contain too little alumina to allow of the formation of feldspar, and too much silica to permit the crystallization of olivine.

Périer (pā-rē-ā'), **Casimir,** 1777–1832; French politician; b. Grenoble; served in the army; engaged in banking business established at Paris by his father and brother; elected to the Chamber of Deputies, 1817; became a leader of the opposition under Charles X; after the Revolution of July, 1830, was Prime Minister from March 13, 1831, to his death.

Périer, Jean Paul Pierre Casimir. See CASIMIR-PÉRIER.

Per'igee, in astronomy, that point of the moon's orbit which is nearest to the earth. Anciently, when the sun and planets were supposed to circulate around the earth, the term was also applied to them.

Périgueux (pā-rē-gĕ'), ancient *Vesunna,* town of France, capital of Dordogne, on the Isle, 67 m. ENE. of Bordeaux; has manufactures of cutlery and nails, woolens, paper, and leather. The ancient town was originally the capital of the Gallic tribe of Petrocorii, whence the modern name. There are remarkable Roman remains. Pop. (1901) 31,796.

Perihe'lion, in astronomy, that point in the orbit of a planet or comet which is nearest to the sun.

Perim (pā-rēm'), Arabian MEHUN, island belonging to Great Britain, in Strait of Bab-el-Mandeb, at entrance of the Red Sea, about 90 m. W. of Aden; area, 7 sq. m.; divides the strait into the Great and Little straits; occupied by the British, 1799–1801; they took formal possession of it, 1857.

Period'icals. See NEWSPAPERS.

Perios'teum. See BONE.

Peripatet'ic Philos'ophy. See ARISTOTLE.

Perissodac'tyla, suborder—or, according to some authors, an order—of the hoofed animals (*Ungulata*), so named because the digits are unpaired or unequal, the third being the largest and most exserted, the fourth nearly equal in size and position with the second, and the fifth on the hind foot at least atrophied. The suborder includes three families: the tapirs (*Tapiridæ*), rhinoceroses (*Rhinocerotidæ*), and horses (*Equidæ*).

Peritone'um, serous membrane investing the viscera of the abdomen. The peritoneum has two layers, and constitutes a closed sac; the external layer lines the abdominal walls; the internal is reflected over the stomach and intestines, liver, spleen, ovaries, uterus, and bladder. These opposed surfaces are smooth and lubricated by secreted serum, permitting the free movements of the viscera, their ascent and descent in respiration, and the peristaltic movements of the bowels.

Peritoni'tis, inflammation of the peritoneum; may be due to injury, to cold, to extension of inflammation from other organs, to general disorder of the blood, or infection. Local peritonitis from extension of inflammation is a frequent occurrence, the inflammatory process being limited to the peritoneal investment of a single organ, as the liver. A very important source of localized peritonitis is the diseased vermiform appendix. Tubercular peritonitis is an infective form due to the action of the tubercular bacillus, which gains access to the

peritoneum through the food, or through the blood from the lungs, intestines, etc. Acute peritonitis, as a rule, is of sudden onset. Abdominal pain is its prominent symptom, at first localized, but quickly diffused over the entire abdomen. The pain is increased by pressure or movements. The face is pale, haggard, and anxious, wearing an expression of great suffering. The teeth are set, the lips tightly drawn, the eye set and sunken, the cheeks collapsed. Peritonitis is always a dangerous disease. When incipient, it may be aborted or limited by local use of ice or cold water, local dry cupping, heart sedatives, and a single prompt saline purge. If fully developed, opium is used to allay pain and secure absolute rest of the intestines. The development of aseptic surgical methods makes it possible to save by proper opening of the abdomen and drainage many cases of peritonitis which would otherwise terminate fatally.

Per'iwinkle, any one of various half-shrubby and herbaceous erect or trailing plants of the genus *Vinca* and family *Apocynaceæ*; *V. major*, *V. minor*, and *V. herbacea* of the gardens are hardy European plants; *V. rosea*, a fine greenhouse evergreen shrub, grows wild in most tropical regions, and also in Florida. PERIWINKLE, popular name for several small mollusks of the genus *Littorina* and allied genera, and particularly *L. littorea*, a species much used for food in Europe. The species has become quite abundant on the E. coast of the U. S. The name is also applied in the U. S. to several large mollusks, *Busycon carica*, *Sycotypus canaliculatus*, and species of *Purpura* which do great damage to the oyster beds of the E. coast.

COMMON PERIWINKLE.

PERIWINKLE. 1. *Littorina littorea*. 2. *Littorina rudis*.

Per'jury, crime of false swearing. He commits perjury who, under oath lawfully administered in a judicial proceeding or course of justice, willfully gives false testimony material to the issue or point in question. The offense is thus defined at common law. In many of the U. S. it is particularly defined by statutes; and these extend the definition, and in some cases make it embrace all false oaths corruptly taken, where an oath by law is required or authorized, whether in judicial proceedings or not. It may be said generally that wherever, under the common law of the land, an oath is required in the regular administration of justice, there the crime is possible. The offense cannot be founded on the violation of a mere oath of office. When the oath falsely taken is one required by federal laws, the offense is committed against the U. S., and is punishable under the "Revised Statutes" by a fine of not more than $2,000 and imprisonment not exceeding five years. The penalty varies in the different states. See AFFIDAVIT; AFFIRMATION; OATH.

Per'manent Way, in railway engineering, the road bed, track, bridges, and buildings of a line of railway, as distinguished from the rolling stock, which consists of the locomotives and cars.

Perman'ganates. See MANGANESE.

Per'mian Se'ries, in geology, a group of rocks occurring in the government of Perm, Russia. Formations of various other countries have been recognized as their equivalents. A more prevalent usage recognizes the Permian epoch as the closing part of the Carboniferous period. In the U. S. approximate equivalents of the Russian beds have been noted in W. Virginia, Kansas, and Utah.

Permuta'tions, in mathematics, a statement of the laws which determine the possible variations in the grouping of any number of given signs. The signs and groups are known as elements and forms. There are three processes of combination. The first, termed permutation, consists in changing the order of the given elements so that the same arrangement is never repeated. The second, termed combination, consists in arranging the elements into partial groups, so that, without regarding the arrangement, precisely the same elements are not repeated in any form. In permutation, all the elements are contained in each form. The third process, termed variation, is a union of the other two. It consists in first making all the forms possible by combination, and then permuting each of these forms.

Pernambuco (pĕr-năm-bō'kō), officially RECIFE, capital of state of same name, Brazil; at the mouths of the Caparibe and Beberibe; consists of three parts—Recife proper and Santo Antonio, on narrow islands, one behind the other, and Boa Vista, on the neighboring

mainland; all on flat ground and connected by bridges. The harbor proper will not admit vessels of more than 17 ft. draft, and large ships anchor in the roadstead, whence landing is often difficult. Pernambuco is nearer Europe than any other important Brazilian port, and almost the only commercial outlet of the state; sugar, rum, cotton, hides, tobacco, cigars, coffee, etc., are exported. Under the Dutch, 1630–54, Recife was a mere village; in the eighteenth century it supplanted the original capital and port, Olindia. Pop. (1902) abt. 120,000.

Péronne (pā-rōn'), fortified town of Somme, France; on the Somme, 27 m. E. by N. of Amiens; surnamed la Vierge for successfully resisting the Imperialists, 1536. In 1815, it surrendered to Wellington, and January 9, 1871, to the Germans. In the World War it was captured by the Germans and retaken by the French Sept. 1, 1918.

Perox'ide of Hy'drogen. See HYDROGEN PEROXIDE.

Perpet'ual Mo'tion, term applied to a mechanism assumed to put itself in motion and to possess sufficient inherent power not only to continue such motion indefinitely (or until the mechanism is worn out), but to have a surplus which can be used in doing useful work. Since the first recorded scheme for a mechanical perpetual motion (by Willars de Honecort, an architect of the thirteenth century) numbers of persons have pursued this *ignis fatuus* of mechanics. In the nineteenth century there were upward of 180 patents (the large majority of them English) granted for machines intended to move perpetually. The searchers for perpetual motion have employed every force in nature, but the majority employ the force of gravity in some way, a favorite contrivance being a wheel provided with movable weights intended to descend on one side at a distance from the center of rotation, and to be raised on the other side through a path much nearer that center.

Perpetu'ity, future contingent interest in property, real or personal, which is not to become a vested interest until a period so remote as to be obnoxious to law. The term is also, though improperly, employed to describe any future estate, whether vested or contingent, in which the absolute power of alienation is suspended for an improper length of time. In New York and several other states the common-law rule has been completely changed by statute, and converted into a rule forbidding the suspension of the absolute power of alienation for a longer period than two (or more) lives in being at the time of the limitation. In most of those states (though not in New York) the further period of twenty-one years allowed by the English rule may also be added.

Perrault (pā-rō'), **Charles,** 1628–1703; French author; b. Paris; admitted to the bar, 1651; elected to the Academy, 1671; aided Colbert in founding the Academy of Arts; made head of the bureau of royal buildings. In 1687 he read before the Academy a poem entitled "The Age of Louis the Great," praising modern writers at the expense of the ancients, which precipitated the quarrel of the "ancients and moderns." Boileau in particular attacked him bitterly. This was followed by "Parallel between the Ancients and Moderns," dialogues comparing Homer and Vergil with the French poets; of more permanent value are "Illustrious Men of the Age of Louis XIV" and his "Fairy Tales," which include "Cinderella," "Blue Beard," and others.

Per'ry, Matthew Calbraith, 1794–1858; American naval officer; b. S. Kingston, R. I.; brother of Commodore Oliver H. Perry; entered the navy, 1809; lieutenant, 1813; later protected American commerce from Greek pirates in the Mediterranean; master-commandant Brooklyn Navy Yard, 1833–43; commodore, 1841; served in the Mexican War; was sent, 1853, to establish international relations with Japan. By an employment of the "gunboat policy," but without having to use force, he induced the Japanese to sign their first foreign treaty, 1854, and to open Shimoda and Hakodate to trade with the U. S.

Perry, Oliver Hazard, 1785–1819; American naval officer; b. S. Kingston, R. I.; entered the navy, 1799; engaged in the war against Tripoli, 1804–5; 1813 served under Commodore Isaac Chauncey on Lake Ontario; fitted out a squadron of nine small vessels at Presque Isle (now Erie, Pa.); attacked and captured the British fleet near Put-in-Bay, Ohio, September 10, 1813; this action, known as the "battle of Lake Erie," was announced by him in the dispatch, "We have met the enemy, and they are ours." Congress rewarded him with a vote of thanks, medal, and rank of captain. Perry cooperated with Gen. Harrison in his operations at Detroit and at battle of the Thames, October 5, 1813, and in the following year was employed on the Potomac and in the defense of Baltimore. He commanded the *Java* in Decatur's squadron in the Mediterranean, 1815; was sent to the Spanish Main in command of a squadron, 1819; was seized with yellow fever, and died at Port Spain, Trinidad. His remains were removed to Newport in a ship of war by order of Congress.

Perseph'one. See PROSERPINE.

Persep'olis, Greek name of ancient capital of Persia; stood in a vast and fertile plain (now MERDUSHT), 35 m. NE. of Shiraz, near the Medus (now POLWAR). Xerxes, Darius, Hystaspes, and others of the Achæmenidæ resided here, and in their time the city was known to the Greeks as a wonder of splendor and magnificence. It was said to be completely destroyed by Alexander the Great. Of the city itself no traces can be found; but of the palaces interesting ruins are extant, known by their local name, Chehel Minar (Forty Columns), or Hall of Xerxes. They consist of a stupendous substructure of cyclopean masonry, forming a platform about 1,500 ft. long, about 800 ft. wide, and divided into three terraces, to which magnificent flights of stairs give access. Of the buildings, a mag-

nificent sculptured staircase, the entrance to a propylæum, and a number of columns, 60 ft. high, are still standing.

Per'seus, in Grecian mythology, son of Zeus and Danaë, daughter of Acrisius, King of Argos; was driven into exile; conquered Medusa, and cut off her head; returned after many adventures to Argos and founded Midea and Mycenæ.

Perseus, in astronomy, constellation, between Andromeda on the W. and Auriga on the E.; mean declination 46° N.; is on the meridian December 24th.

Perseus, abt. 212–164 B.C.; last king of Macedon; son of Philip V; reigned 179–168 B.C.; confirmed the treaty concluded by his father with the Romans, but began secretly to prepare for war, and on June 22, 168, was signally defeated near Pydna. He escaped, but surrendered himself, and died in exile.

Pershing, John Joseph, 1860– ; American military officer; b. Linn county, Mo.; was graduated at West Point, 1886; served in several Indian campaigns, in Cuba and the Philippines; commanded the punitive expedition to Mexico, 1916; promoted brigadier-general, 1906, and major-general, 1916; appointed commander-in-chief of the American Expeditionary Force in France, 1917; placed his armies at the service of Marshal Foch in France and most efficiently co-operated with the Allies in various parts of Europe throughout the remainder of the World War.

Per'sia, country of W. Asia; called by the natives IRAN; bounded N. by Russia and the Caspian, E. by Afghanistan and Baluchistan, S. by the Arabian Sea, Gulf of Ormuz, and Persian Gulf; W. by Turkey in Asia; average length, N. to S., about 700 m.; greatest extent E. to W., about 1,042 m.; area, 628,000 sq. m.; pop. abt. 9,500,000, including some 1,900,000 nomads, chiefly Arabs, Turks, Kurds, Leks, and Lurs; principal cities (only two of which have above 100,000 pop.), Teheran (capital), Tabriz, Mashhad or Meshed, Ispahan, Kashan, Barfurush, Kerman, Yezd, Casveen or Kasbin, Hamadan, Shiraz, Kom, Bushire, and Resht. The people are of many races—Iranian, Turkish, Kurd, Arabic, Armenian, and Hebrew; dominant ones, however, are the Iranian or Persian and the Turkish, the latter of many tribes. The language of the former is what is known as New or Modern Persian (in use since the tenth century), whose vocabulary is not pure Iranian, but largely intermixed with Arabic, owing to the Mohammedan conquest of the country.

The climate is distinguished by dryness, except along the seacoast, where moisture is excessive; by equability, salubrity, and heat; greatest cold on the plain of Teheran 8° to 10° F.; cold of N. sections intense in winter on the elevated plains and mountains.

The topographical outline is that of a vast plateau surrounded by mountain ranges. The central portions are the most elevated, where the plain of Hamadan attains an altitude of 6,000 ft. above the sea. The great ranges of mountains on the N. are the Kara Dag and the Elbruz. On the E. are the Domine Kuh, the Shamshire, and the chain extending S. from near Mashad. The Cotrells are rugged cliffs near the Persian Gulf, cut and worn by the drainage of the great plateau. In the SE. the Zagros, in many parallel ranges, run diagonally S. by E. from the mountains of Kurdistan, which forms a rugged border on the NW. The highest peak is Damavand, an extinct volcano, 18,600 ft. above sea level. The Kizil Uzen, or Safeed, in the N., the Zanda Rud in the interior, and the Karun and Khirkah in the SW. are small rivers, but the chief streams of the country. The Euphrates, Araxes, and Helmund are rivers of the border. The only inland seas worthy of note are the Shahee (Lake Urumeyah), in the NW., and Niris and Mahala, in Farsistan. Nearly every part of the land, except Khorassan and Kerman, is so inhabited that the term desert applies properly to parts of those provinces only.

The soil of the plains is a loam, very fertile when irrigated. The N. slopes of the Elbruz are covered with pine, spruce, and olives; the lowlands on the border of the Caspian are noted for dense growth of forest. Date palms grow in the S. sections. In the interior the vine, pomegranate, mulberry, fig, and olive trees flourish; also the peach, apple, quince, and other fruit trees. Chief agricultural crops, wheat, barley, rice, hay, cotton, tobacco, opium, and a great variety of cucurbitaceous and leguminous plants. Bituminous coal is found in the Elbruz Mountains. White and green marble are found in Khorassan; sulphur on Damavand; lead at Bast; gold near Nikpey; and iron and copper ores in several places. Rock salt and gypsum are abundant. The turquoise mines of Madan, near Nishapur, have been long considered the best mines of that gem. The people are chiefly occupied in agricultural and pastoral pursuits, though a few are engaged in manufacturing woolen, silk, and cotton fabrics. The national religion is Mohammedanism; of non-Mohammedans there are Jews, Armenians, Guebers, and Nestorians. Missions are sustained by the American Presbyterian, Anglican, and Roman Catholic churches. There is, strictly speaking, no educational system. Private schools are formed by the mollahs (priests) for teaching the Koran and writing. There are schools for the education of mollahs, usually built and sustained by a patron. The shah sustains a college in Teheran, where students are taught, in part, the curriculum of European schools and receive an allowance of clothing and funds. Exports are wheat, cotton, tobacco, rice, opium, fruit, oil (olive), wood, wool, hides, silk, and carpets; imports, chiefly cotton and woolen goods, tea, coffee, sugar, petroleum, and notions.

Till 1906 the form of government was in most respects similar to that of Turkey, the shah, or reigning monarch, being an absolute ruler; but, 1905, the people demanded representative institutions, and October 12, 1906, the first National Council met. On January 1, 1907, a constitution was promulgated. The members of the council, 162 in number, are elected by members of the reigning dynasty,

the clergy, chiefs, nobles, landowners, merchants, and tradesmen. A senate of sixty members consists of thirty appointed to represent the shah and thirty elected on behalf of the National Council. The executive is carried on under a ministry of nearly thirty ministers. The country is divided into thirty-three provinces, under governors general directly responsible to the central government. The chiefs of nomad tribes are responsible for the collection of revenues to the governor of the province in which their tribe resides. Iran, native name of Persia, is the official designation of the whole kingdom. The word itself is originally connected with Aryan. As a geographical designation the name Iran applied anciently to the country between the Indus and the Tigris, extending from the Persian Gulf on the SW. to the Caspian and the Oxus on the N., as well as to the Pamir plateau on the NE. The Avestan (sometimes erroneously called Zend) is the oldest representative of Iranian speech.

The Medes and Persians were historically the best-known nations of Iran. The Medes were in point of time the first Iranian nation known to fame, if we accept as Iranic the conquest of Babylon by Medes abt. 2400 B.C., which established a Median dynasty on the Babylonian throne. This dynasty was expelled after two hundred years, and Media was under nominal subjection to Assyria until abt. the eighth century B.C., when she freed herself. In the seventh century the Medes conquered Nineveh and established the Median dynasty of Ecbatana, the first of the great Iranian monarchies. The Persians under Cyrus revolted abt. 550 B.C., conquered Media itself, and established an empire of which Persia was the center. To Persia and Media he added countries inhabited by Semitic races, Babylon, and Assyria. His son, Cambyses (529–22), conquered Egypt and N. Africa, and for two centuries Persia was the most powerful empire in the known world and the center of civilization. It fell before the victorious Alexander, 336 B.C., but in turn the Greek rule was destroyed to give way to the Parthian sway, which lasted 250 B.C.–226 A.D. The Sassanian monarchy then ruled Iran for about four centuries (226–652 A.D.), but this empire was overthrown by the Mohammedans, 652, a conquest which brought the greater part of Iran under the religion of Islam.

Since the Mohammedan conquest the Persians have been governed almost wholly by alien dynasties—Ommyiad, Abbassid, Ghiznevid, Mogul, Timurid, Suffavean, and others. During this period the boundaries of Persia were often changed. It was sometimes a province of a larger empire and sometimes divided between two or more independent states. The present (Kajar) dynasty began with Aga-Mohammed, 1795. His nephew, Fath-Ali, lost in wars with Russia the provinces of Georgia, Armenia, and Erivan. Mohammed Shah, the next ruler, failed to regain Herat, on account of the resistance of Great Britain. Nasr-ed-din (1848–96) also failed for the same reason, but succeeded in extending his territories to the SE. During his reign European improvements were introduced to some extent. Mahomet Ali, who succeeded him, abdicated in July, 1909, after a three years' struggle between the Royalists and the Nationalists, during which some anarchy prevailed in nearly every province. His thirteen-year-old son, Ahmet Ali, was placed on the throne.

Per'sian Gulf, inlet of the Arabian Sea through the Gulf of Oman and the Strait of Ormuz, between Arabia and Persia; 650 m. long, 250 m. broad; receives the water of the Shat-el-Arab; contains many islands, most of which are barren and desolate; pearl fisheries along the Arabian coast are celebrated.

Persigny (pĕr-sē-nyē'), **Jean Gilbert Victor Fialin** (Duc de), 1808–72; French statesman; b. St. Germain-Lespinasse; successively soldier and journalist in Paris; founded *L'Occident français*, Bonapartist organ, 1834; became very intimate with Louis Napoleon; organized Bonapartist party and the attempt on Strassburg; took part in the descent on Boulogne; sentenced to twenty years' imprisonment; released by Revolution of 1848; aid-de-camp to President Napoleon; elected to Legislative Assembly, 1849; conspicuous in *coup d'état*, 1851; Minister of Interior, 1852–54 and 1860–63; ambassador to Great Britain, 1855–60; created duke, 1863; retired after emperor's downfall, 1870.

Persim'mon, tree of the U. S., the *Diospyros virginiana*, of the order *Ebenaceæ*, and its fruit, which is excessively astringent until overripe, but after hard frosts have brought it to the verge of decay is a very sweet and

PERSIMMON.

agreeable fruit. The wood is used for last-making and other turnery. The kaki or Japanese persimmon (*D. kaki*) is the leading fruit tree of Japan; is now planted in California and the S. parts of the U. S. in many varieties, and its fruit is becoming of importance.

Per'sius Flac'cus, Aulus, 34–62 A.D.; Roman satirical poet; extant works consist of six satires, which comprise in all no more than 650 hexameters, and there is no proof that he ever wrote more. His style is exceedingly obscure.

Per'sonal Equa'tion. See EQUATION, PERSONAL.

Perspec'tive, representation by geometrical rules, on a plane surface, of objects as they appear to the eye from an assumed point of view. All the points of the surface of a body are visible by means of luminous rays proceeding from these points to the eye, forming a cone of rays. The intersection of these rays by an intervening transparent plane is the perspective projection of these points, the rules for the projection of which mechanically are simple and well established. The supposed transparent plane is called the plane of projection or plane of the picture. The horizon of the picture is the horizontal line resulting from the intersection of the plane of the picture by a horizontal plane passing through the eye. Point of view or point of sight is the point where the eye is supposed to be placed. Vanishing points are points in a picture to which all lines converge that in the object are parallel to each other. An object is said to be in parallel perspective when one of its sides is parallel to the plane of the picture; in angular perspective when none of its sides are so.

Perspira'tion. See SWEAT.

Per Stirpes (pėr stėr'pēz). See DESCENT.

Perth Amboy', city in Middlesex Co., N. J.; at mouth of Raritan River; on Raritan Bay, Staten Island Sound; 21 m. SW. of New York; in fire clay and kaolin region; has a large and excellent harbor, and contains terra-cotta works, large dry docks, machine shops, iron foundry, oil refinery, chemical works, emery works, cork factory, and immense coal and freight shipping depot and wharves of the Lehigh Valley Railroad. Pop. (census of 1910) 32,121.

Per'tinax, d. 193 A.D.; Roman of humble birth who rose to a position of the highest esteem in military and civil life during the reigns of Marcus Aurelius and Commodus; on assassination of latter was chosen to succeed him as emperor, 192 A.D., but was himself murdered less than three months later.

Perturba'tions, deviations in the motion of a planet from its elliptic orbit, produced by the attraction of other planets on it. Periodic perturbations are those which, in the long run, tend to compensate each other. Secular perturbations are those changes in the form of the orbit which go on in the same direction from century to century. The mathematical theory of perturbation forms the most difficult subject in astronomy, and has taxed the powers of the greatest mathematicians.

Peru', republic of S. America, bordering on the Pacific, between Ecuador on the N. and Chile on the S.; in the N. a tract of about 90,000 sq. m., on both sides of the Marañon, or upper Amazon, is held by Peru, but claimed by Ecuador; Tacna and Arica, formerly S. provinces of Peru, are held by Chile; area, officially established at 695,733 sq. m.; pop., approximately, 4,500,000; chief cities, Lima (capital), Callao, Arequipa, Cuzco. Climate temperate rather than tropical; winter months (May to October) characterized by frequent thick mists, sometimes with light, drizzling rain. The great mountain system of the Andes follows the coast, NW., in two parallel chains—the Cordillera, with its base generally about 20 m. from the coast, and the Andes, 70 to 110 m. farther inland; between them is a region of plateaus and high valleys, varied by spurs from both chains, and cut by the Vilcañota Knot, or cross range, near lat. 14° 30′ S., and the Cerro de Pasco Knot, 9° 15′ S. Near the Ecuadorian frontier few of the mountains in either range exceed 10,000 ft. in height; but from lat. 8° S. there is a succession of snowy peaks, with passes often 15,000 ft. high. The highest summit, the Cerro de Huascan, attains 22,050 ft. The Peruvian volcanoes, only three or four of which are active, are all in the S. part of the Cordillera.

The short rivers of the Pacific slope are all unnavigable. E. of the Cordillera the streams at first follow the axes of the mountain chains, generally N. or NNW.; ultimately break through the Andes in deep gorges, and reach the NE. plains, where they become navigable. The principal trunks are the Marañon, or upper Amazon; Huallaga, and Ucayali. The Javary is a river of the plains on the boundary of Brazil; and the Madre de Dios, one of the four great branches of the Madeira, rises not far from Cuzco. Lake Titicaca, between Peru and Bolivia, is navigated by small steamers, forming part of the route from La Paz to the Peruvian coast. Peru has few well-sheltered harbors, the most important being Callao. Several groups of small, rocky islands—the Lobos, Chinchas, etc.—adjoin the coast. The principal agricultural products are sugar cane, tobacco, cotton, coffee, maize, manioc, coca, potatoes, quinoa, and grapes (used for brandy). Coca, quinoa, and the potato grow wild. Rubber trees abound in the forests. Sheep raising is an important industry. Mineral products include silver, gold, copper, quicksilver, lead, coal, borax, salt, and petroleum. The guano deposits have been a source of great wealth. Among articles of manufacture are woolen and cotton goods, boots and shoes, candles, beer, wines, clothing, furniture, soap, matches, saddles, lard, olive oil, cotton seed oil cake, and cocaine. The leading exports are sugar, silver ore, copper ore, tin ore, rubber, drugs, guano, cotton, wool, and hides. About half the trade is with Great Britain. Value of imports from U. S., 1911, $5,597,123; exports to U. S., $9,314,030. In 1909 the total trade values were $52,516,000.

Peru is a centralized republic; president elected for four years, not eligible for immediate reëlection, and is assisted by a council of ministers. Congress consists of a senate and a house of deputies. The foreign debt in 1911 amounted to $26,253,000. In 1910 the revenues were $13,606,000, and the expenditures somewhat in excess of that amount, figuring for $13,068,000. The state religion is the Roman Catholic, and the public exercise of other cults is forbidden by the constitution, but there is a certain amount of tolerance. The Univ. of San Marcos, at Lima, is the oldest in

the New World. Lima has also a school of mines and civil engineering, a national agricultural school, and a school of arts and trades. The government supports *colegios*, or high schools, in the principal cities, having 2,340 schools and 3,105 teachers. The army consists of 4,000 officers and men; the navy of five vessels.

Vague traditions relate that a powerful dynasty, the Pirua, held the highlands of Peru and Bolivia in very ancient times. The Incas established their power at Cuzco about 1230, and at the beginning of the sixteenth century ruled the Andean highlands and much of the Pacific coast. A division of the empire and a civil war enabled Pizarro (*q.v.*) to conquer the country easily after invading it, 1532. He founded Lima, 1535, as the capital of this and other countries erected into the viceroyalty of Peru, which finally embraced the whole of Spanish America and Panama. New Granada and La Plata were separated from Peru in the eighteenth century, and Chile, Bolivia, and Ecuador early in the nineteenth. Peru declared her independence of Spain, 1821. Civil war led to the conquest of Peru by Bolivar, 1835–36, and a short-lived union of the two countries, 1836–39). In 1879 Chile suddenly claimed the coast lands of Bolivia and S. Peru, and a war resulted, in which the united armies were defeated, the Peruvian navy annihilated, and the unconditional cession of Tarapaca and the conditional cession of the provinces of Arica and Tacna followed.

Peru Bal'sam, exudate from a tree (*Toluifera pereiræ*) of the natural order *Leguminosæ*, growing in San Salvador, Central America. It is a dark-brown, viscid substance, like thick molasses, of a rather fragrant odor, and a warm, bitterish taste; insoluble in water, but mixes with absolute alcohol and chloroform. It contains a resin, a volatile oil, and cinnamic and benzoic acids; its medicinal virtues are feeble, and in the U. S. other balsams have almost completely superseded it.

Perugia (pā-rō'jä), ancient *Perusia*, city in province of same name, Italy; on the Tiber, 1,600 ft. above the sea; is well walled, and entered by gates mostly mediæval or modern; but among them is one of the Etruscan period, bearing the inscription "Augusta Perusia," placed on it by Augustus. Some remains of the old Etruscan walls also still exist. The streets are broad, and the squares flanked by imposing public and private edifices. In the Piazza del Duomo there is a superb fountain, the work of Niccolò and Giovanni Pisano, and a statue of Pope Julius III, 1555. Among numerous churches are the Cathedral of San Lorenzo; San Domenico, a Gothic edifice rebuilt, 1632, containing a monument of Benedict XI by Giovanni Pisano, and San Pietro de' Casinensi, a basilica with a triple nave and walnut stall work designed by Raphael. Some of the palaces contain choice works by renowned artists, especially the Palazzo del Collegio del Cambio, which is rich in frescoes by Perugino. From many of the suppressed convents and other sources a valuable collection of pictures by the best masters of the Umbrian school, such as Perugino, Raphael, etc., has been brought together in the Academy of Fine Arts near the university. Without the gates are some remarkable antiquities; among others, the Torre di S. Manno, on which is a celebrated Etruscan inscription. The chief industries are the manufacture of silks, woolens, liqueurs, wax candles, etc. Perugia was one of the oldest of the twelve chief Etruscan cities, and one of the last to fall before the Romans. Pop. (1907) 61,385.

Perugia, Lake of (ancient *Lacus Trasimenus*), lake of Italy; province of Perugia; 30 m. in circumference; surrounded by wooded hills. Here Hannibal defeated the Romans, 217 B.C.

Perugino (pā-rō-jē'nō), **Pietro Vannucci**, 1446–1524; Italian painter; b. Citta della Pieve, Umbria; became friend and fellow pupil of Leonardo da Vinci at Florence; settled, abt. 1475, in Perugia; assisted in decorating the Sistine Chapel, and executed masterly frescoes in the Exchange of Perugia; but his pictures subsequent to 1505 show the fatal influence of the love of gain, to which he sacrificed his art. Many of his works were executed by his pupils from his designs.

Peru'vian Bark. See CINCHONA.

Peruzzi (pā-rōt'sē), **Baldassare da Siena**, 1481–1536; Italian architect; b. Accajano; considered the inventor of architectural perspective painting, perfected by Del Pozzo. One of his best works was the Villa Farnesina in Rome, which contained his own fresco of the "History of Medusa." In 1520 he succeeded Raphael as the architect of St. Peter's. The sacking of Rome, 1527, ruined him.

Pesaro (pā'sä-rō), ancient *Pisaurum*, fortified city of Italy, capital of province of Pesaro and Urbino, on the Adriatic, 36 m. NW. of Ancona; has fine churches and palaces, and formerly manufactured famous pottery; flourished under the Roman Empire and under the exarchate of Ravenna, and was one of the cities of the Pentapolis. Pop. (1907) 25,103.

Peshawar (pā-shou'ėr), town in the Punjab, India; on the border of Afghanistan, opposite the mouth of the Khyber Pass; is a British defensive military station, famous as "the bulwark of the Indian Empire against Afghanistan." Pop. (1901) 95,147.

Peshito (pĕ-shĭt'ō), standard Syriac translation of the Old and a part of the New Testament; probably made in the second and third centuries of the Christian era; generally believed to be the work of Christian Jews. The Peshito of to-day is a revision of a primitive text, of which the Gospels were discovered in the convent of Mt. Sinai, 1892.

Pes'simism, in popular usage, a term often applied to any doctrine or opinion, or even to any mood, which appears to be predominantly gloomy, especially when such a view or state of feeling leads the one who possesses it to make an unhappy forecast of the future. In technical philosophical usage pessimism denotes any doctrine concerning the universe,

and especially concerning the life of man as a whole, which leads to an explicit condemnation of the world, and of life, as being essentially and radically evil. Philosophical pessimists have frequently coördinated with the painfulness of life the necessary failure of finite beings to attain satisfactory knowledge; and this inevitable "ignorance" has been a fruitful source of pessimistic condemnation of existence. Yet some thinkers, not pessimists, have made pain a prominent and, in fact, a predominant feature in finite existence, as such, and have nevertheless explicitly defined the universe as essentially good, on the ground that the realization of the ideal, at least in some due measure, is possible, despite, or even through, the very presence of pain in the world. In any case, in order to avoid numerous misapprehensions, it is well to remember that no one is a pessimist merely because he calls life painful, but rather because he regards life as a "failure." Pessimism depends, then, on first assuming or maintaining some sort of ideal of what life ought to be or to become, and on then asserting that this ideal cannot be attained, owing to the radically evil constitution of the world. Schopenhauer (*q.v.*) developed a systematic philosophy of pessimism.

Pessi'nus (now BALA HISSAR), ancient city of Galatia, Asia Minor; on the Sangarius; center of the worship of Rhea or Cybele, mother of the gods. The almost shapeless stone image of the goddess, fabled to have fallen from heaven, was kept in her chief temple and attracted worshipers from all over the Eastern world. The temples and public buildings of Pessinus then surpassed in magnificence those of any other city in Asia Minor.

Pestalozzi (pĕs-tä-lôt'sē), **Johann Heinrich**, 1746–1827; Swiss educator; b. Zurich; established on his domain of Neuhof in Aargau a manual labor school for poor children, 1775; but he was obliged to close it, 1780. In 1781 he set forth his principles of home education in his novel "Leonard and Gertrude." After various self-sacrificing efforts in regard to schools, he opened, 1800, an institution at Burgdorf, in conjunction with Krüsi and others, which may be regarded as his first systematic attempt to carry out his views. These were more fully explained in his work "How Gertrude Teaches Her Children," which called universal attention to his school. In 1804 it was removed to a monastery at Buchsee, adjoining Hofwyl, the estate of Fellenberg, who soon controlled the management. Pestalozzi found Fellenberg's methods so different from his own that, 1805, he removed to Yverdun. Teachers were sent to him for instruction, and the Pestalozzian system was adopted in Prussia and other parts of Germany; but dissensions among his teachers ended disastrously, and after sustaining for five years a school for the poor at Clindy, a sort of appendage to that of Yverdun, he retired to Neuhof, 1825. The most important of his remaining works is "Fortunes of my Life, as Principal of my Educational Institutions at Burgdorf and Yverdun."

It is impossible to summarize Pestalozzi's services to education, for he rather set on foot ideas than originated methods. He was preeminently a man of feeling and imagination. He would never admit that he had a carefully thought-out system. Judged by ordinary standards, he would have been considered anything but a good teacher. His true function was to educate ideas. Raumer sums up the services Pestalozzi did for education in these words: "He compelled the scholastic world to revise the whole of their task, to reflect on the nature and destiny of man, and also on the proper way of leading him from his youth toward that destiny."

Pesth. See BUDAPEST.

Pe'ter, name of three czars of Russia: PETER I, THE GREAT, 1672–1725; b. Moscow; son of Czar Alexis Michailowich; 1682, succeeded Feodor, but Ivan V, Peter's brother and the lawful heir, was announced as joint sovereign through the efforts of their sister Sophia, who for several years directed the affairs of the empire. After seven years of tutelage Peter thrust the princess regent into a convent, and the inactive Ivan, 1689, abdicated his share of the government. The new czar reorganized the army; built a small navy; went to sea in person on Dutch and English ships, so as to learn the practical part of navigation, and took Azov from the Turks, 1696, thus realizing his ambition of gaining for Russia a port on the Black Sea. He lived abroad, 1697–98, chiefly at Saardam, Netherlands, and at Deptford and London; worked as a ship carpenter and blacksmith; and for some months studied the sciences. In 1698 he took 500 English mechanics, engineers, etc., to Russia, and in the same year, the Strelitzes having revolted, he ordered them all to be put to death; but pardoned a few on the scaffold, notably the young Orloff, founder of the princely house of Orloff.

Peter reformed the calendar, founded schools, introduced arithmetic (hitherto unknown in Russia), compelled rich merchants to engage in foreign commerce, and enacted rules for dress and deportment; entered on a war of conquest against Sweden, supported by Denmark and Poland, 1700, and in the same year was defeated by Charles XII at Narva; founded St. Petersburg, 1703; invaded Courland, 1705; overthrew the Swedes at Pultava, 1709; seized the Baltic provinces, 1710, and Finland, 1713; married Catharine I, his mistress, 1707; declared her czarina, 1711; waged an unsuccessful war against the Turks, 1711; finally gave up most of Finland in the Peace of 1721; put to death his son Alexei, 1718, on the ground of treasonable conduct; conquered three Caspian provinces from Persia, 1722. He was succeeded by Catharine I, his wife. Peter was the first Russian to take the title of emperor, 1721.

PETER II, ALEXEIEVITCH, 1715–30; b. St. Petersburg; grandson of Peter the Great; succeeded Catharine I, 1727; prominent features of his reign were the intrigues between the families of Mentchikof and Dolgoruki. The czar was only twelve years old and completely

under the sway of Mentchikof, who had him betrothed to one of his own daughters and jealously kept him away from the court and all business; but the Mentchikofs were overthrown by the Dolgorukis, who planned a marriage between the czar and a daughter of their house, which was prevented by Peter's death.

PETER III, FEODOROVITCH, 1728–62; b. Kiel; son of Peter the Great's daughter Anna, who had married a duke of Holstein; designated as heir to the crown, 1742, by his aunt, the Empress Elizabeth; married, 1745, the Princess of Anhalt-Zerbst, afterwards Catharine II; ascended the throne January 5, 1762; had great admiration for Frederick II, with whom he immediately made peace, restoring to him the conquered provinces; hated the royal dynasty of Denmark, against which he was on the point of waging war when a revolution, headed by his wife, broke out at St. Petersburg. Taken by surprise, he was deposed, Catharine was proclaimed empress, and he was strangled in his bed at Ropscha by the brothers Orloff.

Peter I, 1844 – ; King of Servia; son of King Alexander (reigned, 1842–56); grandson of King Karageorge; served in French army in Franco-German War; married Princess Zorka, daughter of Prince Nicholas of Montenegro, 1883; proclaimed king by the army after military revolt and murder of King Alexander and Queen Draga, June 10, 1903; then elected by National Assembly. See SERVIA.

Peter, Epis'tles of St., The First, one of the catholic or general epistles; was written from "Babylon" (perhaps symbolical for Rome, but more likely the name of the actual city, which contained many Jews), abt. 64 A.D. Ramsay maintains that it was not written till 80 A.D. It is evidently the product of perilous times and inculcates the duty of patience under suffering. It is a practical epistle, and addresses itself to various classes of readers, to each assigning the appropriate duty. It is the subject of one of the great religious classics—the commentary by the saintly Archbishop Leighton.—PETER, EPISTLE OF ST., THE SECOND, has suffered more from doubts as to its authenticity than any other book of the New Testament. It is directed against heretics and corrupt men, and the second chapter, in which they are described, bears a striking resemblance to the Epistle of St. Jude. There is, however, no good reason to abandon the Petrine authorship.

Peter, Saint, first in the list of the twelve apostles; b. Bethsaida, Galilee, on the shore of Lake Gennesaret, whence he removed to the adjoining village of Capernaum; was a fisherman, like his brother Andrew, and, like him, was probably a disciple of John the Baptist, but he followed Christ immediately when called. His original name was Simon, which Christ changed, declaring, "Thou art Peter, and upon this rock I will build my Church" (Matt. xvi, 18). From his call to the office of apostle, and up to the time of the apostles' council in Jerusalem, the events of his life are told in the Gospels and the Acts. His personal character is so distinct and strongly marked that there probably are no readers of the Bible who have not a vivid conception of it, or any two whose conceptions differ very much; but after the apostles' council in Jerusalem, 50 A.D., he is only heard of at Antioch, 52, when his inconsistency exposed him to Paul's stern rebuke (Gal. ii, 11), and in 57, when he is incidentally referred to by Paul (I Cor. ix, 5).

Pe'terboro, a manufacturing city on Trent Valley Canal, in Ontario, Canada. A fall of 50 ft. on the Otonabee River gives unlimited power. Largest lift-lock in the world is on the canal near by. City has manufactures of electrical appliances, agricultural machinery, cordage, canoes, brick, pottery, and furniture. Pop. (1911) 18,360.

Pe'terborough, city, partly in Northamptonshire, partly in Huntingdonshire, England; on the Nen, 76 m. N. of London. It is celebrated for its beautiful cathedral, built between 1118 and 1528, chiefly in the Norman style; length, 476 ft.; height of nave to ceiling, 81 ft., of lantern-shaped tower, 135 ft.; breadth, 202 ft. across the transept. The Early English W. front, of three arches, is one of the grandest products of mediæval architecture. The city has a large trade in agricultural produce, coal, and malt. Pop. (1901) 30,870; of soke of Peterborough, 41,122.

Peter Mar'tyr, d. 1252; patron saint of the Inquisition; Dominican of Verona; for severity with which he exercised his inquisitorial functions, was slain at Como by the infuriated populace. His death formed the subject of a masterpiece by Titian, destroyed by fire in Venice, 1867.

Peter Par'ley. See GOODRICH, SAMUEL GRISWOLD.

Pe'tersburg, city; formerly in Dinwiddie Co., Va.; now independent; on the Appomattox, 12 m. from junction with the James; 22 m. S. of Richmond; built on a hill sloping to the river; has abundant power for manufacturing from falls in the river; contains the Southern Female College, Petersburg Female College, Bishop of Payne Divinity School for colored students, Central State Hospital for Insane, Home for the Sick; has large tobacco warehouses, tobacco factories, cotton mills, corn and flour mills, foundries and machine shops for heavy machinery, silk mills, trunk factories, granite quarries, and other industries. The city is on the site of an Indian village burned by Nathaniel Bacon, 1676; has been called the "last citadel of the Confederacy" from its heroic defense in the Civil War.

The Army of Potomac, under Gen. Grant, crossed the James River below City Point, June 14–16, 1864, and made formidable assaults on Petersburg, June 15th, 16th, 17th, and 18th, carrying portions of the exterior lines on each of the first three days; but, being generally unsuccessful in the assaults of the 18th; the ground occupied at the close of the day was intrenched and held up to the close of the war, forming part of the line of investment. The Union loss in killed, wounded, and miss-

ing was 10,586. The siege began June 19th, and was continued by constantly gaining and intrenching ground to the left and moving against the railways with a view to isolating the city, combined with the explosion of a mine under one of the works, with the resulting "battle of the crater," and numerous other actions. The siege was continued until April 2, 1865, when, the place being no longer tenable, Lee withdrew his army, the Union troops taking possession on April 3d, the surrender at Appomattox occurring April 9th. Pop. (1910) 24,127.

Pe'ter's, St. See ST. PETER'S CHURCH.

Peter's Pence, or **Rome'scot,** ancient tax for the benefit of the pope, probably first levied as a tax for the support of the English school at Rome. Peter's Pence was paid the pope, with some interruptions, until 1534, during the reign of Henry VIII, when it was abolished. During the nineteenth century it was revived as a voluntary popular contribution, and is one of the chief sources of the pontifical revenue, especially since the establishment of the Italian monarchy.

Peter the Her'mit, d. 1115; apostle of the first crusade; b. Amiens, France; after trying several pursuits, became a hermit, and abt. 1093 undertook a pilgrimage to Jerusalem, where the oppressions which he witnessed determined him to arouse the people of Christendom to undertake a war for the liberation of the Holy Sepulcher. The first host of crusaders was led by Peter himself, but he left them before their defeat at Nicæa. He was present at the conquest of Jerusalem by Godfrey of Bouillon, and afterwards founded the abbey of Neufmoutier, near Huy.

Pétion (pā-tē-ôn'), **Anne Alexandre Sabès,** Haitian politician; b. Port-au-Prince; was a quadroon; served with the French army in Haiti; joined the revolt of 1791; commandant of artillery under Toussaint Louverture, but went over to Rigaud, 1799, and was forced to leave the island with him, 1800. Going to France he was attached to Leclerc's expedition, destined to subdue Haiti; did efficient service, but at the end of 1802 joined the new revolt of those who feared that slavery would be reestablished. On death of Dessalines, Christophe seized the government of the N. provinces, but the rest of Haiti remained in the hands of the mulatto party, which declared a republic and made Pétion president, 1807; reelected 1811 and 1815. Christophe and the black party, who still held the N., waged an almost continual war against Pétion, whose many enlightened measures were often defeated by ignorance and malice.

Peti'tion, Right of, right of a citizen to petition those in authority for a redress of grievances. In free countries this is regarded as a most valuable right, and it is expressly secured by constitutional provisions in the U. S. It prayed for a reaffirming of the laws which prohibited unlawful taxes and forced loans, illegal arrests and imprisonment, quartering of soldiers upon private citizens, and a resort to martial law in time of peace.

Petition of Right, celebrated English statute passed in reign of Charles I (3 Car. I, c. 1, 1627 A.D.) to restrain and limit the acts and prerogatives of the crown, and secure the personal and civil liberties of the subject. This declaration of the legislature is one of the fundamental and constitutional guaranties by which civil and political liberty is secured to the British people. Although it does not contain in express terms the statement of broad principles, but rather deals with particular instances of executive wrongdoing, yet it is regarded as including and establishing the principles of personal right and liberty in the most comprehensive manner.

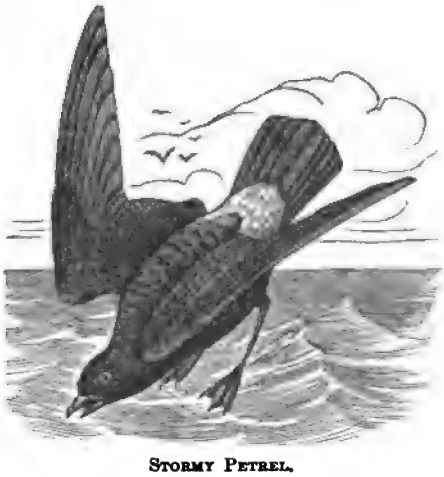
Pe'to, Sir Samuel Morton, 1809–89; English railroad contractor; b. Woking, near London; became a master builder, 1830, and among the important edifices erected by his firm were the Houses of Parliament. After 1845 he was contractor for many of the most important railroad lines in England, Canada, and other countries. In 1855 he was made a baronet for building at his own expense a railroad from Balaklava to Sebastopol during the Crimean War. He was at different times in Parliament, 1847–68, when he retired on account of the failure of his firm, with liabilities exceeding £7,000,000. He published "Taxation, its Levy and Expenditure" and "Resources and Prospects of America."

Pe'tra, ancient city of Edom; 50 m. S. of the Dead Sea; on the mountain ridge E. of the wady el-Arabah; a few m. E. of Mt. Hor; the Selah of 2 Kings xiv, 7; taken from the Edomites by Amaziah, 839–810 B.C.; in the hands of the Moabites abt. 700 B.C.; and capital of the Nabathæans (descendants of Nebaioth, the eldest son of Ishmael) abt. 300 B.C., when the Greeks first knew it as Petra. During the reign of Trajan, 105 A.D., it was conquered by the Romans; is mentioned several times by Eusebius and Jerome as an ecclesiastical metropolis; but is not heard of after abt. 536 A.D. The ruins, shut in by cliffs from 150 to 300 ft. high, occupy an area of about ½ m. square; are approached through a narrow and dark cañon; and chiefly consist of remains of tombs, a theater, and a building supposed to have been a temple, all cut from the living rock, not built.

Petrarch (pē'trärk), **Francesco,** 1304–74; Italian poet; b. Arezza; son of a member of the Bianchi party, friend of Dante, and banished with him from Florence, 1302; family settled in Avignon, 1313; Francesco studied law to please his father, but on the latter's death entered the Church, receiving, however, only minor orders. On Good Friday, 1327, he saw for the first time, as he tells us, a woman who inspired in him a profound affection for herself and influenced his whole spiritual life —Laura de Noves, wife of Hugues de Sade. In her praise he indited over 300 sonnets and 50 canzoni; her death, 1348, he celebrated in "The Triumph of Death." After having vainly traveled to forget or moderate his love, he settled at Vaucluse, near Avignon, where he wrote some of his finest works. His literary

reputation attracted the regard of princes; he was invited to Naples, Paris, and Rome, and received the laureate crown in the capital of the latter city. From 1370 till his death he lived at Arqua, near Padua. He wrote partly in Italian and partly in Latin. His works in the latter were most esteemed in his day; those in the former by later generations. His prose works (Latin) include "Letters" to his friends and acquaintances, "On Contempt of the World," "On True Wisdom," "Lives of Illustrious Men"; verse includes eclogues, and an epic, "Africa," on the subject of the second Punic War.

Pet'rel, any member of a family (*Procellaridæ*) of sea birds belonging to the order *Tubinares.* Petrels have long, narrow, pointed wings, hooked beaks with the nostrils opening in a tube. The plumage is thick, soft, rather oily, and has a peculiar, ineradicable musty smell. Petrels are preëminently sea birds, only coming ashore to breed, and are found in all oceans, very sparingly in the tropics, most abundantly in the colder portion of the



Stormy Petrel.

S. temperate zone. The largest species is the giant fulmar (*Ossifraga gigantea*), frequently called the Cape hen and Mother Carey's goose by sailors, a bird about 3 ft. long and 7 ft. in spread of wing, of a sooty color, lighter below. This species ranges N. in the Pacific to the coast of California, but the S. seas are its true habitat. A small species, variously known as the stormy petrel and Mother Carey's chicken, is the smallest of web-footed birds, some 6 in. long, and black; nests in clefts of rocks and holes along the N. Atlantic coast. Sailors look on this bird as ominous of evil, but they all have a superstitious dread of injuring it. Many believe that each one contains the soul of a shipwrecked mariner; others consider them witches. It is often seen in the most stormy weather, and frequently rests on the waves.

Pe'trie, William Matthew Flinders, 1853– ; English Egyptologist; b. Charlton; son of Capt. Matthew Flinders, royal navy, Australian explorer; engaged in mapping ancient British earthworks, 1875–80, and excavating in Egypt, 1880–1903; Edwards Prof. of Egyptology, University College, London, after 1892; chief discoveries, Greek settlements at Naukratis and Daphne, prehistoric Egyptians at Koptos and Naqada, inscription of Israelite war at Thebes, and kings of the earliest dynasties at Abydos; chief publications, "Stonehenge," "Pyramids and Temples of Gizeh," "Six Temples at Thebes," "Royal Tombs of the Earliest Dynasties."

Petrograd (city of Peter), new name of St. Petersburg, Russia, changed by imperial decree Sept. 1, 1914.

Petrog'raphy, that branch of science which has for its object the study of rocks; includes the investigation of the nature, origin, composition and structure, genetic relationship, and secondary alterations in all rocks. The investigation of rocks as a separate department of geology dates its modern importance from the successful application of the polarizing microscope to the study of rock sections, cut thin enough to be transparent, the way to which was first pointed out by Sorby, 1858.

Petro'leum, fluid form of bitumen, distinguished from maltha by its lessened viscidity, and its occurrence, in even its most dense forms, free from water; known also as rock oil and mineral oil; the Trenton limestone oils are very black; those of Oil Creek, Col., S. America, Russia, Germany, Japan, and India are brown; the Bradford oils and those of the lower Alleghany and the vicinity of Washington, Pa., are amber colored. In a few instances natural petroleum has been obtained almost colorless. In specific gravity it varies from .7 to 1.2, water being 1. It is insoluble in water, but itself dissolves about two per cent of water. It is partially soluble in all of the varieties of naphtha, in all varieties of alcohol, ether, chloroform, bisulphide of carbon, turpentine, and the other solvents of bitumen. Petroleum occurs in deposits of nearly all geological ages, from the lower Silurian up to the Quaternary. It often exists in subterranean cavities, the oil having collected in them from the subjacent strata, and having been retained by the impervious overlying sandstones.

Petroleum has been known in Persia, China, Japan, and other countries since the earliest times. Herodotus, 500 B.C., wrote of the springs of Zante, which are still flowing; and described how the oil was collected on a myrtle branch dipped into the spring. Pliny and Dioscorides mention the oil of Agrigentum, used under the name of "Sicilian oil." At Point Apscheron, near Baku, on the Caspian Sea, at the E. end of the Caucasus Mountains, springs of petroleum have been known from very early times. At Yenangyoung ("earth-oil river"), on the Irawadi, a heavy sort of petroleum has long been obtained from dug wells or pits, and sold under the name of "Rangoon tar." As early as 1834 Selligue had made in France shale oil that was used for lighting. In 1850 James Young, of Scotland, introduced into commerce paraffin oils made from the Torban Hill shale, known as

"Boghead coal." This industry soon extended to other European countries and to the U. S. Outside the U. S. the regions furnishing petroleum to commerce are those of Russia, which extend along the Caucasus Mountains; those of Galicia and the Danubian principalities, Wallachia and Moldavia; and a small area in Peru. The Russian oil fields are chiefly confined to a small area near Baku, which yields wells remarkable for their enormous output. Operations have been carried on here since 1873.

Although oil flowed from wells drilled for brine along the Alleghany Mountains, 1790–1820, it was utilized in a few localities only. In 1854 a company was organized to obtain oil in Pennsylvania, and to use it commercially, and, 1859, the first well was drilled in the region where Titusville now stands. Then followed the discovery of oil in New York, NW. Ohio, NE. Indiana, Kanawha Co., Ky., Barren Co., Ky., and in Illinois. Since 1880 wells in California have produced oil steadily, the great oil field of Texas has been developed, and Wyoming, SE. Colorado, Kansas, Oklahoma, and Tennessee have become oil-producing states. The value of petroleum produced in the U. S., annually, exceeds $125,000,000, the largest producers being Ohio, W. Virginia, Pennsylvania, Indiana, California, Texas, and Kansas. Pipe lines of wrought iron to convey oil extend out of the oil regions to Chicago, Cleveland, Buffalo, Jersey City, Philadelphia, Baltimore, and other cities. In Russia a line extends from Baku on the Caspian Sea to Batum on the Black Sea, a distance of about 600 m.

Kerosene is the most important product of petroleum, but other products are used for illumination, such as gasoline, benzine, gas oil, astral oil, and mineral sperm. The paraffin and other lubricating oils prepared from petroleum have largely superseded animal and vegetable oils throughout the world, while for coarse and heavy bearings the use of crude petroleum has become universal. Crude petroleum is used extensively for fuel, chiefly for steam purposes. The residuum of the refineries is also used on steamers on the Volga and the Caspian Sea, and on locomotives throughout S. Russian. Gasoline is widely used for domestic heating and cooking. The most volatile products of the distillation of petroleum are used for explosion in the cylinders of motors, after the manner in which gas is exploded in the cylinders of gas engines. The asphaltic residues of California petroleum, as well as coke pitch, are used for coating paper and in making varnishes, paints, lacquers, etc. The earliest use of petroleum, both in Europe and in the U. S., was in diseases of the skin, in rheumatism, and consumption; it is still largely a constituent of embrocations. A filtered paraffin residue, under the name of vaseline, cosmoline, or petroleum ointment, is extensively used, not only as a basis of medicated ointments, but general in households. Rhigolene has been used as an anæsthetic; cymogene has been used in ice machines. See BITUMEN; KEROSENE.

Petrol'ogy. See PETROGRAPHY.

Petromyzon'tidæ, single family of the order *Hyperoartii*, comprising the forms known as lampreys and lamprey eels. All the species undergo a metamorphosis, and a very different form is possessed by the young or larvæ. The species are, to some extent, parasitic, and fasten themselves by their suckers to fish, whose flesh they consume by abrasion.

Petro'nius Ar'biter, author of a Latin romance, "Satiræ," also called "Satiricon," which in a half comical manner gives a description of the vices and debauchery of Roman society under the first emperors, now in prose, now in verse, sometimes witty, occasionally obscene. Of the work, which seems to have been very large, only fragments are extant.

Petropavlovsk', strong Russian naval station on the E. coast of Kamchatka, commanding the N. Pacific; is the chief town of the peninsula. Pop. abt. 400.

Pe'trus de Apo'no. See ABANO, PIETRO D'.

Petrus Lombar'dus. See LOMBARD, PETER.

Pet'ty, Sir William, 1623–87; English political economist; b. Romsey, Hampshire; was an officer in the navy; obtained, 1647, a patent for his invention of a "pentagraph" or copying machine; chosen Prof. of Anatomy, Oxford, 1651; of Music in Gresham College, 1651; physician to the army in Ireland and secretary to Henry Cromwell, 1652; entered Parliament, 1658; at Restoration was knighted and made Surveyor General of Ireland; author, among other works, of "The Political Anatomy of Ireland," "Treatise on Taxes and Contributions," "Political Arithmetic," and a treatise on money entitled "Quantulumcunque," which have procured him the reputation of being the principal founder in England of the science of political economy.

Petu'nia, genus of annual, biennial, or perennial plants of the family *Solanaceæ*, natives

DOUBLE-FLOWERED PETUNIA.

of the hot regions of America. The *Petunia nyctaginiflora* and *P. violacea* are cultivated

in European and N. American gardens, and have afforded numerous hybrid and other varieties, some of which are very beautiful.

Peucer (poi'tsĕr), **Kaspar,** 1525–1602; German reformer; b. Bautzen, Saxony; was Prof. of Mathematics and of Medicine at Wittenberg; son-in-law of Melanchthon, after whose death, 1560, he became physician to Augustus, Elector of Saxony, who regarded him as the principal exponent of Melanchthon's views; but, 1574–86, he was imprisoned on account of his alleged Crypto-Calvinistic doctrines, and afterwards was physician to the Prince of Anhalt-Zerbst.

Peutinger (poi'tĭng-ẽr), **Konrad,** 1465–1547; German antiquary; b. Augsburg; was an actuary, and published works on German antiquities, etc., but is best known by his map, now in the Vienna library, called the "Tabula Peutingeriana," giving the military roads of a large portion of the Roman Empire, probably based on an itinerary of the fourth century.

Pe'wee, or Phœbe (fē'bē) **Bird,** well-known fly catcher of the U. S., the *Sayornis fuscus*, which often builds under old bridges, mills,

Common Pewee.

and at other points near the water. It is easily recognized by its well-known note, whence its name is derived.

Pew'ter, alloy of tin with other metals. The English pewterers recognize three kinds: plate, trifle, and ley pewter; the first and hardest being used for household articles, the second for beer pots, and the third for larger wine measures. Plate pewter is composed of 100 parts of tin, 8 of antimony, 2 of bismuth, and 2 of copper, and has a bright silvery luster. Trifle contains 83 parts of tin and 17 of antimony, with usually considerable lead. Ley or common pewter contains 4 parts of tin and 1 of lead.

Peyer (pī'ẽr), **Johann Konrad,** 1653–1712; Swiss anatomist; b. Schaffhausen; was a professor at Basel, distinguished for original dissections and observations on the closed glands of the mucous membrane of the small intestine; those which are collected into plates or patches are known as Peyer's glands or Peyer's patches.

Phædra (fē'drā), in Greek legend, wife of Theseus and stepmother of Hippolytus, with whom she fell desperately in love. When he refused to comply with her wishes, she accused him to his father of an attempt on her honor, but when she heard that he had perished in consequence of his father's wrath, she confessed her guilt and committed suicide. The tragedies on this subject by Sophocles and Euripides are lost, but there is a celebrated one by Racine.

Phæ'drus, Roman author; b. Thracia; taken to Rome as slave; made free by Augustus; was the first to raise the fable to the dignity of a special branch of Roman poetry. He wrote five books of fables, now extant but incomplete, containing ninety-three fables in all, many of which, however, are only versifications of the fables of Æsop.

Phaethon (fā'ē-thŭn), in Grecian mythology, son of Helios. He obtained one day permission to drive the chariot of the sun across the heavens, but the horses ran off, and the chariot was just about setting heaven and earth on fire when Zeus struck down the driver with a thunderbolt. He fell into the Eridanus, and his sisters, the Heliades, who stood mourning by his corpse, were transformed into poplars and their tears into amber.

Phagocytosis (făg-ō-sī-tō'sĭs), word first used by Metchnikoff to express the destruction of bacteria and other injurious substances by means of white blood corpuscles, which in inflammation leave the vessels and enter into the tissue, their function being to eat up and destroy bacteria and other injurious solid substances.

Phalanger (fā-lān'jẽr), common name for a marsupial of *Cuscus, Phalangista,* or a related genus of the family *Phalangistidæ,* popularly

Flying Phalanger.

known in Australia as an opossum. Phalangers are about the size of a cat; have a long, bushy, prehensile tail; are clad in thick, woolly fur; are arboreal and nocturnal in habits; live on fruit and leaves; found in Australia and Tasmania. The flying phalangers, of the genus *Petaurus,* have, like the flying squirrels,

a fold of membrane running from the fore to the hind leg, which serves as a parachute and enables them to take long leaps.

Phalanx (fā'lănks), in military organization of ancient Greece, the tactical unit of the heavy armed troops, a body of foot soldiers armed with spears and shields. The number of men was various. They were arranged from four to sixteen men deep. In later times the great phalanx under the Macedonians comprised 16,384 men, and was composed of four minor phalanges, each of which had two merarchies, or halves. Each merarchy was composed of two chiliarchies, each of these of four syntagmata, and each syntagma of 256 men.

Phal'áris, proverbially the most cruel tyrant known to antiquity; ruler of Agrigentum in Sicily for about sixteen years, in the middle of the sixth century B.C. Of his history hardly anything is known with certainty, most of it being enveloped in fables. A prominent feature in these fables is the brazen bull, invented by one Perillus, in which Phalaris roasted his enemies, inaugurating the ingenious instrument of torture by the roasting of its inventor.

Phal'arope, any one of three species of small wading birds, resembling sandpipers, but having the toes lobed, or furnished with scallop-

WILSON'S PHALAROPE.

like margins, which enables these birds to swim and dive with great ease. They are found in the N. hemisphere and breed far N.

Phal'lic Wor'ship, adoration of the generative organs as symbols of the creative power of nature. In early ages the sexual emblems were adored as most sacred objects, and in the several polytheistic systems the act or principle of which the phallus was the type was represented by a deity, to whom it was consecrated: in Egypt by Khem, India by Siva, Assyria by Vul, primitive Greece by Pan and later by Priapus, Italy by Mutinus or Priapus, among Teutonic and Scandinavian nations by Fricco, and in Spain by Hortanes. Phallic monuments and sculptured emblems are found in all parts of the world, and the worship still prevails in the East.

Phanariots, or **Fanariots** (fă-năr'ĭ-ŏts), Greeks who reside in the Phanar or Fanar district of Constantinople, whose ancestors escaped the fury of the Turkish conquerors after the capture of that city by Mohammed II, 1453. They are distinguished for their wealth and ability, and great political influence.

Phan'tom. See GHOST.

Pharaoh (fā'rō), royal title of the Egyptian kings, used generally alone in the Bible, rendering it impossible to distinguish between successive sovereigns. Only in the later periods were other names added, as Pharaoh-Necho and Pharaoh-Hophra.

Pharaoh's Hen. See EGYPTIAN VULTURE.

Pharisees (făr'ĭ-sēz), political and religious party among the Jews; originated during the time of the Maccabees in opposition to the invasion of Greek ideas and Greek customs. While the Sadducees and the ruling aristocracy had yielded to the idea of a distinction between religion and politics, the Pharisees still maintained the old and genuinely Jewish view of a theocracy; and while the Sadducees adhered rigorously to the literal conception of the words of the sacred books, the Pharisees adopted the tradition as a means by which to interpret Scripture. Thus the Pharisees stood at the time of Christ at once as the national party in politics and as the progressive school in theology.

Pharmacopœia (făr-mă-kō-pē'yă), book containing formulas and direction for preparing and compounding drugs for use in the treatment of disease. Such a book may be the outcome of individual enterprise or the execution of an order of the government. In many European states the "Pharmacopœia" is issued by the authority of the government, and penalties are attached to failure on the part of the pharmacist to observe its directions. In the U. S. there is no general law compelling physicians or pharmacists to follow the directions of the "Pharmacopœia," but it is recognized as the best guide in regard to the preparation and compounding of drugs, and is the basis of all intelligent teaching on pharmacy.

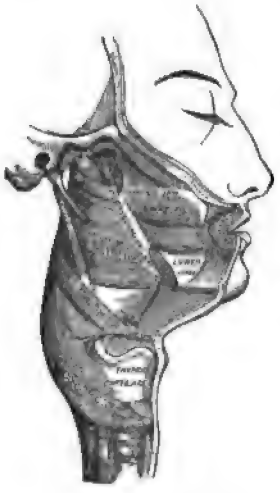
Phar'macy. See APOTHECARY.

Pha'ros, ancient name of a small island off Alexandria, Egypt; connected with the mainland by a mole, and famous for its lighthouse, which was numbered among the seven wonders of the world, and gave the name of Pharos to all structures of a similar kind.

Pharsa'lus, ancient city of Thessaly, in Thessaliotis; near the Enipeus, and at the foot of Mt. Narthacius; chiefly celebrated for the battle fought in its territory (called Pharsalia), August 9, 48 B.C., between Cæsar and Pompey, which decided the fate of the Roman world, the latter being crushed.

Pharynx (făr'ĭnks), musculo-membranous sac situated at the base of the skull, immediately behind the mouth, nose, and larynx, and in front of the cervical vertebræ, extending as

far down as the esophagus. It has the following openings into it: Two from the nose, the posterior nares; two Eustachian tubes, which communicate with the middle ear; the mouth, larynx, and esophagus. It is lined by mucous membrane, which is continuous with that lining the various cavities opening into it. Beneath this mucous coat is a fibrous layer; and beneath this, again, is a muscular layer, which diminishes the capacity of the pharynx, and by successive contraction from above downward carries food along into the esophagus. The pharynx is freely supplied with glands, which are situated in the mucous membrane, and there is considerable lymphoid tissue. This is similar in structure to the tonsillar gland. The function of the pharynx is to give passage to the food in deglutition and to the air in respiration. The pharynx is a common seat of catarrhal inflammations, occurring acutely as "colds" or as more chronic affections. Those who smoke tobacco or drink strong alcoholic beverages, as well as those whose occupation requires public speaking, and especially that in the open air, are liable to a peculiarly obstinate form of inflammation of the pharynx.



PHARYNGEAL MUSCLES.

Phasian'idæ, family of birds including most of the gallinaceous fowls.

Pha'sis, ancient name of the Rion or Faz River; in Russian province of Transcaucasia; considered by classical geographers the boundary between Europe and Asia. The Argonauts were fabled to have landed at its mouth.

Pheasant (fĕz'ănt), gallinaceous bird of the subfamily *Phasianinæ* of the family *Phasianidæ*, which includes the handsomest of the rasorial birds. The name is extended to a number of other game birds. In the U. S. it is applied to the ruffed grouse (*Bonasa umbellus*), in those sections of the country where the quail (*Colinus*) is termed partridge. *Phasianus colchicus* originally inhabited W. Asia about the Caspian and SE. Europe, but it has been introduced in other localities, especially in England, and in the U. S. is very commonly known as the English pheasant. It is nearly 3 ft. long, half of this being due to the tail. The plumage is rich and variegated. The long tail feathers, so characteristic of the males of the true pheasants, reach their maximum in Reeve's pheasant (*P. reevesii*), in which they attain a length of over 5 ft. Pheasants are ground-frequenting birds, and feed on grubs, insects, seeds, and grain. They are mostly polygamous, and the numerous eggs are deposited in a very rude nest. With the exception

COMMON PHEASANT.

of *P. colchicus*, they are confined to Asia and some of the large adjacent islands, and Japan.

Phenacetin (fē-năs'ē-tĭn), coal-tar product which occurs in colorless needles, slightly soluble in water; general action on the system almost identical with that of antipyrin and antifebrin; is thought to be safer than those remedies. In nervous headaches and other nerve pains it gives relief.

Phe'nic Ac'id. See CARBOLIC ACID.

Phe'nol. See CARBOLIC ACID.

Phenol Col'ors, class of artificial dyes derived from coal tar; most important, (1) *picric acid*; (2) *dinitro-cresol*, known as *Victoria yellow*, *aniline yellow*, etc.; (3) *aurin*; (4) *rosolic acid*; (5) *azuline*; (6) *phenicin*; (7) *pæonine*. The phenols combine with phthalic acid to form another class of colors, known as the phthalic acid colors; and they also combine with azo-compounds. See AZO-COLORS.

Phe'ræ, ancient city of Thessaly; near Mt. Pelion; on the Pagasæan Gulf; site of the modern Velestino. Jason, son of Polyphron, succeeded to the throne of Pheræ, 378 B.C., and subdued the greater part of Thessaly up to Pharsalus. Pheræ then became a splendid and prosperous town, and, under the government of the nephew of Jason, Alexander, the controlling power of the whole of Thessaly. In 358 B.C. Alexander was murdered, and, 352 B.C., Pheræ passed, with the rest of Thessaly, into the hands of Philip of Macedon.

Pherecydes (fĕr-ĕ-sī'dēz) **of Sy'ros**, Greek philosopher of the sixth century B.C.; considered by some the earliest Greek prose writer; was a rival of Thales and teacher of Pythagoras.

Phid'ias, 500–432 B.C.; greatest sculptor of Greece; b. Athens; taught by Hegias and Ageladas; career as sculptor began under Cimon, but reached its glory under Pericles. The buildings that crowned the Acropolis at Athens are believed to have been erected under his direction, and much of the work may be

ascribed to his hand. The great statue of Athene in the Parthenon, of gold, ivory, and precious stones, was (there is little room for doubt) executed by him. It was finished 437 B.C. Later, he completed the colossal statue in gold and ivory of Zeus in the temple of Olympia at Elis. It sat enthroned in the temple for eight hundred years, and was finally destroyed by fire abt. 475 A.D.

Phigalia (fē-gā-lē'yă), city of Arcadia, near the frontier of Messenia, now Pavlitza; celebrated chiefly for the Temple of Apollo Epicurius at Bassæ, on the top of Mt. Cotylium, some miles from Phigalia. The temple was built by Ictinus, one of the architects of the Parthenon, at Athens. Thirty-six columns and their architraves are still standing. The frieze, made up of sculptures now called the Phigalian marbles, is in the British Museum.

Philadel'phia (from a Greek word meaning "brotherly love"), third most populous city in the U. S.; coextensive with Philadelphia Co., Pa.; on the Delaware and Schuylkill rivers; 85 m. SW. of New York City; area, 129½ sq. m.; water frontage, 38 m.; pop. (1910 census) 1,549,008. Among the buildings of historic importance, Independence Hall stands first. The Old Swedes Church; Christ Episcopal Church, where Bishop White preached, Washington worshiped, and Franklin and Robert Morris are buried; Carpenters' Hall, in which the first Continental Congress met; William Penn's house, which stood in Letitia Street, removed to Fairmount Park; the house at No. 239 Arch Street, where Betsy Ross made the first American flag for Washington; and the site of the house, at Seventh and Market streets, where Jefferson wrote the Declaration of Independence, are a few of the city's possessions rich in historical associations. The principal National Government buildings are the new U. S. Mint, the Post Office, Customhouse, Naval Asylum and Hospital, and two arsenals, the most noted being the Frankford. Among the parks are Stenton and Bartram's Garden, the first botanical garden in America. The Schuylkill and the romantic Wissahickon flow through Fairmount Park. The Zoölogical Garden comprises 33 acres. In the lower Schuylkill section of the park are 500,000 trees and shrubs.

The Philadelphia Bourse, erected 1894 at a cost of $2,000,000, is intended as a place for the display and sale of everything made in Philadelphia's widely scattered mills and factories. The Philadelphia Commercial Museum, founded 1895 for the development of foreign trade, has a commodious building. One international and two pan-American congresses and a national export exposition have been held under its auspices. The site of the navy yard at League Island, including nearly 1,100 acres, was presented to the U. S. by the city, 1862.

The educational institutions are headed by the Univ. of Pennsylvania, connected with which are the Wistar Institute of Anatomy and Biology and the Flower Astronomical Observatory. The Jefferson, Medico-Chirurgical, Philadelphia Polyclinic and College for Graduates, the Woman's, and the Hahnemann are well-known medical colleges. The Pennsylvania Institution for the Deaf and Dumb, at Mount Airy; the Asylum for the Blind, and the Pennsylvania Working Home for Blind Men are prominent local charities. The Academy of the Fine Arts, founded 1805, is the oldest art institution in the country. The Drexel Institute imparts industrial education to both men and women. The Pennsylvania Museum and School of Industrial Art was incorporated 1876. Its valuable collection of fabrics, metals, curios, etc., has been maintained in Memorial Hall, the permanent building erected by Pennsylvania at the Centennial Exposition, 1876. Girard College educates orphan boys only. The Temple College has an evening department for working people at a nominal charge, and a day and afternoon department for all grades of scholars. The Wagner Free Institute of Science has a lecture room, library, and natural-history museum, and provides free lectures on scientific subjects. The Franklin Institute was founded 1824 for the promotion of the mechanic arts and manufactures. The American Philosophical Society, made famous in the eighteenth century among scientists by the attainments of Rittenhouse, the astronomer, and with the general public by the more popular experiments of Franklin, was founded 1743.

The oldest hospital in America is the Pennsylvania, founded 1751. The Philadelphia City Hospital is the largest in the U. S. in capacity. Each of the great medical schools maintains a hospital, and most of the hospitals have training schools for nurses. The Nurses' School of the Lying-in Charity, founded 1828, is the oldest in America and the second oldest in the world.

The leading industrial establishments are the Baldwin Locomotive Works and the Cramp shipbuilding yards. Among the manufactured articles are carpets and rugs, woolen goods, leather, boots and shoes, worsteds and knit goods, clothing, iron wares, machine-shop products, drugs and chemicals, bricks and tiles, dentists' materials, glassware, saws. Eleven per cent of all the textiles made in the U. S. are produced in Philadelphia. "Factory-system" plants, 1909, 8,379; capital employed, $691,397,000; value of products, $746,076,000, making Philadelphia the third city in the U. S. in industrial importance. There are 9 steamship lines from Philadelphia to European ports, 3 to Jamaica and the W. Indies, 1 to Pacific ports, and 6 coastwise. The International Navigation Company is capitalized and controlled here. Philadelphia has 3 large shipyards, 4 large dry docks, large coal wharves and grain elevators, and has an extensive export trade in grain and flour, cattle, horses, sheep, and hogs, coal, animal products, and machinery. A short distance above the mouth of the Schuylkill, at Point Breeze, is the terminus of the pipe lines of the Standard Oil Company, where tank steamers receive about 35 per cent. of all the oil exported from the U. S. Philadelphia is the fourth city in the U. S. in the amount of annual bank clearings, aggregate (1911) $7,683,683,000; capital of thirty-three national banks, $22,655,000; assets, $432,856,261; assessed property valuation (1911), $1,533,-

791,867; municipal debt, $109,829,800; value of real estate owned by city, $270,914,558. In year ending June 30, 1908, the tonnage of vessels entering the port was 2,672,883; clearing, 2,327,119; value (1910-1) of imports of merchandise, $83,626,647; exports, $69,956,380.

In 1636 a band of Swedish colonists settled at the village of Wiccaco, now a part of the city. William Penn, with a company of Friends, or Quakers, arrived, 1682, and the city of Philadelphia was named, surveyed, and partly settled. Dutch and German pioneers, on invitation of Penn, arrived at Philadelphia, October 6, 1683, and settled Germantown, now a ward of the city. Opposition to the Stamp Act took form 1765. The act of Parliament imposing duties on paper and tea was resisted, 1768, and when, 1773, the news reached Philadelphia that the tea ships were on their way, the people met in the State House, October 17th, and adopted resolutions, which were unanimously readopted by the Boston meeting, November 5th. Carpenters' Hall was the meeting place of the first Continental Congress of 1774, and the State House that of the second congress, which met May 2, 1775, and, July 2, 1776, agreed to the resolution declaring that the united colonies "are, and of right ought to be, free and independent states." On July 8th the Declaration of Independence was first publicly read from the platform of the observatory, in the square back of the hall, and the Liberty bell, in the State House steeple, fulfilled the prophecy of its inscription, "Proclaim liberty throughout the land to all the inhabitants thereof!" Lord Howe entered the city September 26, 1777, and the British occupied it until June, 1778. On their departure Congress returned.

The convention which framed the Constitution of the U. S. met at the State House in May, 1787, and adjourned September 18th. Under the Constitution, Philadelphia was the capital of the U. S., 1790–1800. The nineteenth century was marked locally by the opening of the waterworks, 1801; completion of the Schuylkill Canal, 1825; opening of the Germantown Railway, 1832; lighting of the streets with gas, 1836; abolition riots, 1834, 1835, and 1838; burning of Pennsylvania Hall by a mob, May 17, 1838; anti-Catholic riots of May and July, 1844; consolidation of the boroughs and townships of the county with the city proper, 1854; Civil War period; and Centennial Exposition. During the Civil War Philadelphia was the headquarters of the U. S. Christian Commission. A fair held here, 1864, netted $1,080,000 for the sick and wounded soldiers under the care of the U. S. Sanitary Commission.

Philadelphia. See ALA SHEHR; AMMAN.

Phi'læ, sacred island in the Nile, S. of the first cataract (about 24° N. lat.), devoted principally to Isis and Osiris, who were worshiped here for seventy years after the edict of Theodosius, 381 A.D., prohibiting the native cult; was regarded as one of the graves of Osiris, and was hence a resort of pious pilgrims. On its W. side a large temple of Isis, built by Nectanebo II and extended by the Ptolemies and the Roman emperors down to Diocletian. A small but exceedingly beautiful temple to Isis, on the E. of the island, was built by Nerva Trajanus, and is usually known as Pharaoh's Bed.

Philel'phus, or **Filelfo** (fĭl-lĕl'fō), **Francesco,** 1398–1481; Italian humanist; b. Tolentino; became Prof. of Eloquence at Padua at age of eighteen; taught eloquence and moral philosophy at Venice, 1417–19; secretary to the Venetian Consul General at Constantinople, 1420–27; employed on diplomatic missions; returned to Venice, 1427, to take the Chair of Eloquence; later lived at Bologna, Florence, Siena, and Milan; held a professional chair at Rome, 1474–76; returned to Milan, 1476, and to Florence, 1481, to take the Chair of Greek Literature.

Phile'mon, abt. 360–262 B.C.; Greek comic poet; b. Syracuse or Soli; began to exhibit plays abt. 330, and produced ninety-seven, of which the titles of about fifty remain. His subjects are chiefly love intrigues, and his plays are remarkable for their wit and elegance.

Philemon, husband of Baucis, of Phrygia; together they entertained Jupiter and Mercury when they, traveling in disguise, had everywhere been refused hospitality. In reward, the gods transformed their cottage into a temple.

Philemon, Epis'tle of St. Paul to, a letter written at the same time as the epistles to the Ephesians and Colossians. It is a private letter, begging forgiveness and acceptance as a brother beloved for a runaway servant, Onesimus, who had been converted through the apostle's teachings. It is stated by tradition that the letter was written from Rome. Others suppose Cæsarea was the place. One tradition makes St. Philemon a bishop of Colossæ, and in the Roman missal he is commemorated on November 22d.

Phil'ip (Indian, METACOMET), **King,** d. 1676; American Indian chief; youngest son of Massasoit, sachem of the Wampanoag or Pokanoket Indians of Massachusetts; succeeded to chieftainship on death of his brother Alexander, 1662; visited Plymouth and pledged friendship to the colonists; 1675 headed the war known by his name, in which thirteen towns were destroyed and 600 colonists killed; was himself killed by expedition under Benjamin Church, after his tribe had been nearly annihilated.

Philip (the APOSTLE), fourth of the twelve called to the apostleship; b. Bethsaida; is often mentioned in the gospels, especially by John (vi; xii, 20–22; xiv, 8), but must not be confounded with Philip the Evangelist, mentioned in Acts vi, who had four virgin daughters who prophesied (Acts xxi, 8, 9). By the Fathers they are so confounded that it is impossible to separate them.

Philip (surnamed THE BOLD), 1342–1404; Duke of Burgundy; son of John the Good of

France; saved his father's life in battle of Poitiers, 1356; received duchy of Burgundy, 1363; established the power of Burgundy in the Netherlands by marrying Margaret of Flanders, 1369; during minority and later insanity of Charles VI, Philip assumed the regency of France, which involved him in many feuds with his brother, the Duke of Anjou, and his nephew, the Duke of Orleans, but which he held to his death.

Philip (the EVANGELIST), one of the seven deacons (Acts vi, 5); persecution drove him to Samaria, where he confounded Simon Magus (Acts viii, 5). He was instrumental in the conversion of the Ethiopian eunuch (viii, 2 *seq.*); afterwards preached in Cæsarea (viii, 40), where Paul met him (Acts xxi, 8), and Greek Church legends make him Bishop of Tralles, in Lydia.

Philip (surnamed THE GOOD), 1396–1467; Duke of Burgundy; grandson of Philip the Bold; succeeded his father, John the Fearless (assassinated), 1419, both in the duchy and the regency of France; married, 1424, Jacobæa of Holland, heiress of Holland, Brabant, Zealand, and the rest of the Low Countries. To avenge murder of his father, at instigation of the dauphin, afterwards Charles VII, Philip allied himself with England, and acknowledged by the Treaty of Troyes (1420) the English King as the legitimate heir of the French crown after the death of Charles VI. The arrogance of the English, however, provoked him afterwards to break the alliance, and, 1435, he concluded a separate peace with Charles VII and aided him in expelling the English from France; succeeded by Charles the Bold.

Philip (surnamed THE MAGNANIMOUS), 1504–67; b. Marburg; Landgrave of Hesse; succeeded, 1509; began to reign, 1518; strong friend of the Protestant cause; introduced the Reformation into Hesse, 1526; a founder of the Smalkaldic League, 1531; was forced to submit to Charles V, 1547, and imprisoned five years.

Philip, abt. 1177–1208; Emperor of Germany; second son of Frederick Barbarossa; became King of Suabia and Tuscany on his father's death, 1190, and emperor on death of his brother, Henry IV, 1198; his rival, Otho IV, contested the election as emperor, and a ten years' war ensued; the pope favored Otho and excommunicated Philip, but was later reconciled to him. Philip was assassinated; succeeded by Otho.

Philip, name of five kings of Macedonia, the most important of whom were: PHILIP II, 382–336 B.C.; b. Pella; son of Augustus II and father of Alexander the Great; learned the art of war under Epaminondas; succeeded his brother Perdiccas, 359; repeatedly defeated the bordering powers; enlarged his dominions by successive encroachments; extinguished the liberties of Greece by the victory of Cheronæa; appointed commander of the Greeks against the Persians; and was preparing to invade Asia when he was killed by Pausanias. PHILIP V, abt. 235–179 B.C.; son of Demetrius II; succeeded his uncle, Antigonus Doson, 220; as commander of Achæan League, defeated the Ætolians and Spartans, 218–17; formed alliance with Hannibal against the Romans, 215; defeated by the Romans under Titus Quintius Flamininus at Cynoscephalæ, 197; was able but cruel monarch; left throne to his son, Perseus.

Philip, name of six kings of France, who follow: PHILIP I, 1052–1108; son of Henry I and Anne of Russia; succeeded his father under the regency of Baldwin, Count of Flanders, 1060; excommunicated for repudiating his wife and marrying the wife of the Count of Anjou; had troubled reign; involved in war with William Rufus of England; forced by pope to acknowledge his eldest son, Louis, as coregent. PHILIP II (surnamed AUGUSTUS), 1165–1223; son of Louis VII; succeeded his father, 1180; joined King Richard of England in a famous crusade to the Holy Land; quarreled with Richard; when latter was imprisoned by Henry VI, Philip invaded Normandy, confiscated a portion of the English King's territories in France, and prepared to invade England; turned his arms against Flanders and gained battle of Bouvines, 1214; more distinguished as administrator than as soldier; Paris owes much to his munificence. PHILIP III (surnamed THE BOLD), 1245–85; son of Louis IX; accompanied his father to Tunis; succeeded his father, 1270; made peace with Tunis; sustained a war against Alfonso X, King of Castile, 1276; undertook one against Peter of Aragon, who had invaded Sicily, but died during its progress. PHILIP IV (surnamed THE FAIR), 1268–1314; son of the preceding; acquired Kingdom of Navarre by marriage, 1284; succeeded his father, 1285; carried on wars with the English and Flemings; had quarrel with the pope, and was excommunicated; States-General first assembled, 1303; persecuted and suppressed the Knights Templars; succeeded by his son, Louis X. PHILIP V (surnamed THE LONG), abt. 1293–1322; second son of the preceding; succeeded Louis X, 1316; died during a persecution of the Jews; succeeded by his brother, Charles IV. PHILIP VI (PHILIPPE DE VALOIS), 1293–1350; founder of royal house of Valois; son of Charles of Valois; succeeded Charles IV, 1328. Edward III of England, grandson of Philip the Fair, laid claim to the French throne, and when Philip undertook to support David Bruce of Scotland, the English King made an alliance with Flanders and declared war, 1337, thus opening that terrible contest between the French and English dynasties which lasted for one hundred years, exhausted England, and devastated France. The two prominent events of the war during the reign of Philip VI were the battle of Cressy, 1346, in which the French army was totally routed, and the capture of Calais by the English, 1347.

Philip, name of five kings of Spain, who follow: PHILIP I (surnamed THE HANDSOME), 1498–1506; b. Bruges; son of Emperor Maximilian I of Germany; obtained Spanish crown by marriage with Joanna, daughter of

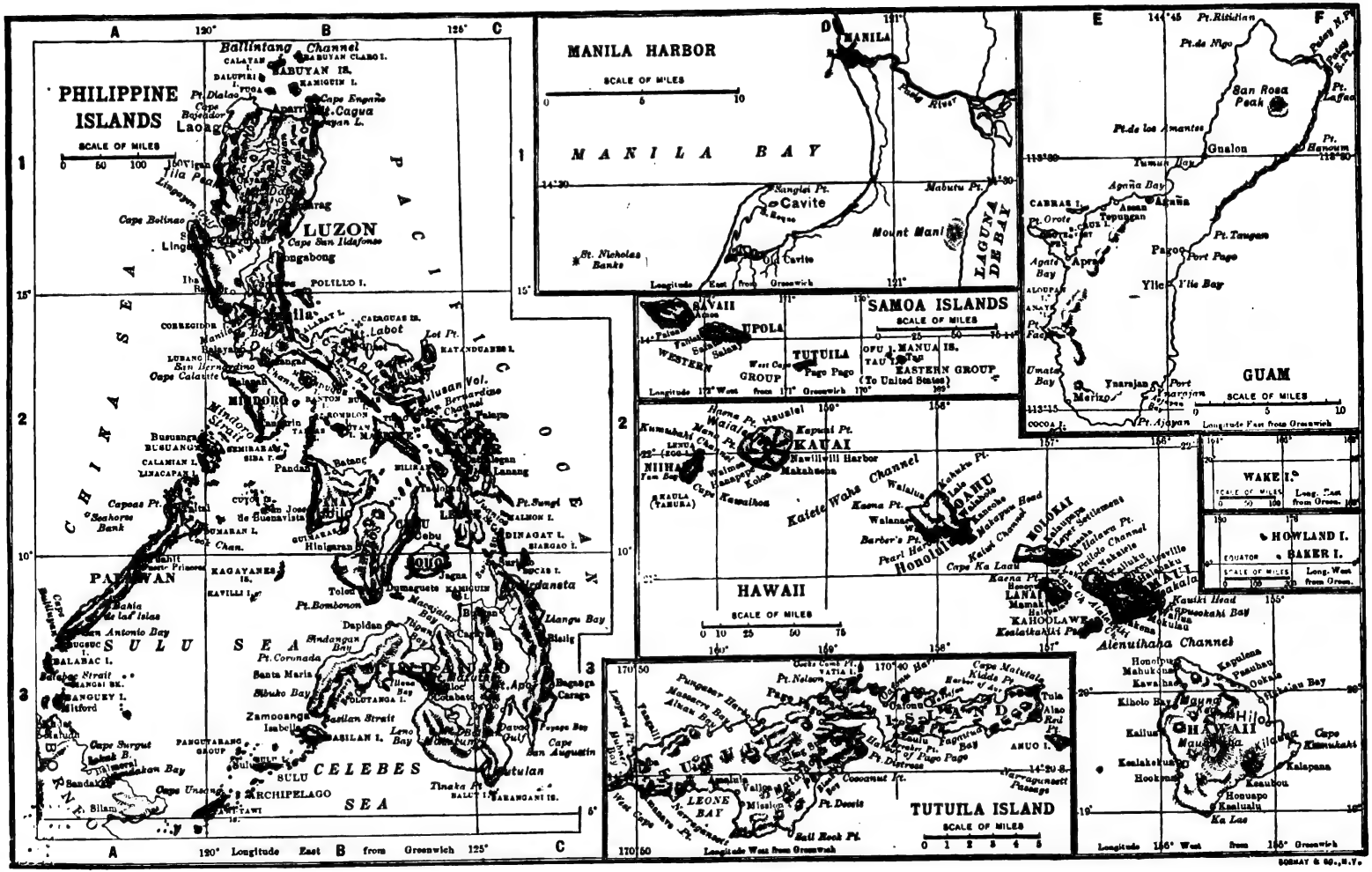
Ferdinand and Isabella of Aragon and Castile; left sons later known as emperors Charles V and Ferdinand I, and four daughters who became queens. PHILIP II, 1527–98; b. Valladolid; son of Emperor Charles V and Isabella of Portugal; received from his father the duchy of Milan, 1540; kingdoms of Naples and Sicily, 1554; lordship of the Netherlands, 1555, and Kingdom of Spain and its dependencies, 1556. From his father's reign he inherited a war with France, Pope Paul IV, and the Turkish sultan, but the Duke of Lava drove the French out of Italy and compelled the pope to sue for peace under the walls of Rome, while the victories of St. Quentin and Gravelines, won by Egmont, enabled Philip to conclude an advantageous peace with France at Câteau-Cambrésis, 1559. His attempt to establish the Inquisition in the Netherlands, 1565, led to revolution, long war by land and sea, and the birth of the Dutch Republic. Operations against Turks were crowned by the great naval victory of Lepanto, 1571, but his celebrated "invincible armada" was defeated by the English, 1588. He conquered and annexed Portugal, 1581; lived to see failure of designs on the Netherlands, France, and England; married into the royal families of England, France, Austria, and Portugal; changed capital of Spain from Toledo to Madrid; succeeded by his son, Philip III. PHILIP III, 1578–1621; b. Madrid; succeeded, 1598; indolent and incapable; allowed Duke of Lerma to continue war in the Netherlands till 1609, when finances failed and a twelve-year truce was signed. The most disastrous event in reign was the expulsion from Spain of about 1,000,000 Moors, largely farmers and traders, 1610; nation declined rapidly after his reign; succeeded by his son, Philip IV. PHILIP IV, 1605–65; b. Valladolid; succeeded, 1621; controlled by Duke of Olivarez; renewed war against the Dutch on expiration of truce, 1621; joined Emperor of Germany in league against Protestants; at war with France, 1635–59; made peace with all enemies, excepting France, by Treaty of Westphalia, 1648; lost Portugal by successful revolution and victory of Villaviciosa, 1665; also several colonies, islands, and cities; succeeded by his son, Charles II. PHILIP V, 1683–1745; b. Versailles; second son of Louis, dauphin of France; known in youth as Duc d'Anjou; claimed throne of France under will of Charles II, 1700; claim contested by Archduke Charles of Austria; "War of the Spanish Succession" followed; France supported Spain; England, Holland, Savoy, Portugal, and Prussia supported Austria. The war began, 1702; Philip lost heavily, but victories of Duc de Vendôme and Marshal Villars confirmed him on throne. Peace restored to Europe by Treaty of Utrecht, 1713; war renewed, 1717; Spanish fleet defeated by English in Mediterranean; peace renewed, 1720; Philip abdicated to his son Louis, 1724, but Louis's death soon after caused him to resume power; made alliance with France, under which his son, Don Carlos, conquered Sicily and Naples, 1733; succeeded by his son, Ferdinand VI.

Philip, Marcus Julius (surnamed THE ARAB), d. 249 A.D.; Roman emperor; b. Bosra, Arabia; rose from being a common soldier to the highest rank in the army; gained the throne, 244, by the murder of Gordian; made peace with Persia; popular for a time by his liberality; defeated by Decius at Verona, and killed by his own troops.

Philip'pi, ancient town of Macedonia; built, or at least enlarged, by Philip, from whom it received its name; became famous as the place where the battle was fought, 42 B.C., between Brutus and Cassius on the one side and Antony and Octavius on the other; Brutus and Cassius were totally routed. St. Paul founded a Christian church here.

Philip'pians, Epis'tle to the, letter written by the apostle Paul when he was a Roman prisoner. The Philippian Church, to which he was especially attached, sent one of their number, Epaphroditus, to supply his wants. This epistle is a letter of thanks for the gift, but it goes beyond its primary purpose and gives information concerning himself, adding warnings and advices for their benefit. It is the warmest and most affectionate of all Paul's letters.

Phil'ippine Is'lands, possession of the U. S., occupying the most N. part of the E. end of the geographical grand division known as the E. Archipelago, in E. Asia. Through the capital and chief emporium, Manila, they are the key to the commerce of the islands that border the steam routes between Japan and China and the Philippines, the Sulu Archipelago, the islands of the S. Pacific, the coasts of Borneo, Celebes Sea and Islands, Molucca and Gillolo passages, Banda and Arafura seas, the coasts of Papua, or New Guinea, and Australia to the SE. and S., and Indo China, Siam, Malay Peninsula, Java, and India, and countries beyond to the SW. and W. They lie entirely within the N. torrid zone. They received their present name from Ruiz Lopez de Villalobos, one of the early discoverers, in honor of the Prince of Asturias, afterwards King Philip of Spain. The archipelago is bounded on the N. by the China Sea, on the E. by the Pacific, on the S. by the Celebes Sea and Borneo, and on the W. by the China Sea. The nearest land on the N. is Formosa, a dependency of Japan, 93 m. NW. of Y'Ami, the most N. of the Batanes group; on the E. the Pelew Islands (German), 510 m. off Mindanao; on the S. Ariaga (de la Silla Island), the most N. of the Carcaralong group (Dutch), 37 m. S. of the Saranganis, off Mindanao; on the SW. the extreme E. point of Borneo, 24 m. SW. of Sibutu; on the S. Balambafigan, an island off the extreme N. coast of Borneo, 31 m. S. of Balabac; and on the W. Cochin China, 515 m. W. of Palawan. The nearest approach of the international dividing line between Asia and Oceania passes about 15° (900 nautical miles) E. of Batac Island, off the NE. coast of Sâmar, in about lat. 12° 40′ N. The land surface within the limits defined is 127,853 sq. m.—greater than the combined areas of the states of New York, New Jersey, Pennsylvania, and Delaware (104,970 sq. m.), nearly twice as large as the five states of New England (66,425 sq. m.), and larger than the


PHILIPPINE ISLANDS
LUZON
MINDORO
PALAWAN
MINDANAO
CELEBES
SULU ARCHIPELAGO
SULU SEA
CELEBES SEA
CHINA SEA
PACIFIC OCEAN
Ballintang Channel
Bashee Channel
Balintang Channel
Luzon Strait
Sibutu Passage
Basilan Strait
Verde Island Passage
Lingayen Gulf
Manila Bay
Subic Bay
Batangas Bay
Tayabas Bay
Lamon Bay
Ragay Gulf
Davao Gulf
Illana Bay
Sindangan Bay
Dapidan Bay
Iligan Bay
Macajalar Bay
Panguil Bay
Sibuko Bay
Malampaya Sound
Balabac Strait
Mindoro Strait
Verde Island Passage
Cape Bojeador
Cape Engaño
Cape Bolinao
Cape San Ildefonso
Cape Calavite
Cape Santiago
Cape Corrondado
Cape Unacan
Cape Buliluyan
Cape Serpent
Pt. Dialao
Pt. Cagua
Pt. Labot
Pt. Bombonon
Pt. Sangi
Pt. Apo
Pt. Desmoro
Pt. Flechas
Pt. Tinaka
Pt. Sepoc
Pt. Seahorse Bank
Mt. Labot
Mt. Isarog
Mt. Mayon
Mt. Banahao
Mt. Malindang
Mt. Apo
Mt. Matutum
Mt. Parker
Mt. Balatukan
Mt. Dulit
Mt. Kinabalu
Taal Vol.
Iligan Vol.
Camiguin Vol.
Lake Taal
Lake Lanao
Lake Buluan
Lake Mainit
Lake Naujan
Lake Bombon
Lake Buhi
Lake Dapao
Lake Malanao
Lake Pulangi
Lake Sebu
Lake Liguasan
Lake Taka Bolo
Lake Tagoloan
Lake Mapanuepe
Lake Sultan Alonto
Lake Bunot
Lake Sambulawan

New England states, New York, and New Jersey (123,860 sq. m.).

The archipelago comprises about 3,141 islands and islets; largest islands, Luzon, Mindanao, Samar, Panay, Leyte, Cebu, Mindoro, Masbate, Negros, Bohol, Romblon; chief cities, Manila (capital), Bauan, Lipa, Laoag, Batangas, Argao, Cebu, Barili, Carcar, Sibonga, San Carlos, Tobaco, Janiuay, Miagas, all above 20,000; pop. (1908) 8,097,371, including uncivilized natives, Chinese, mestizos, offspring of Chinese and natives, and European and American. Natives, ethnologically arranged, comprise the Negritos, the earlier if not the aboriginal inhabitants; Indonesians, confined to Mindanao; Malayans (forty-seven race and tribal names), dominant races being the Visayas, Tagalogs, the furthest advanced in civilization; Bicoles, Ilocanos, Pangasinâns,, Pampangos, Cagayanes, and Moros. Spanish is the language common to all educated people, the mass speaking only the native dialect peculiar to their respective localities, but the use of English is rapidly extending. Climate essentially tropical, the normally high temperature oscillating between narrow limits. Nights often 10° to 20° cooler than the days; mean annual temperature at Manila, 80° F.; hottest season, March to June; greatest heat generally felt in May, maximum ranging 80°–100° in shade; coolest weather in December and January, temperature seldom rising in the day above 75°; year divided into the wet and dry seasons; the dry polar current from the NE. prevailing from October to April and the moist SW. monsoon for the rest of the year. From July to October, inclusive, rains are very heavy, and large tracts of lowlands are flooded. Mean annual rainfall at Manila, 75 in.; extremes of annual precipitation, 121 to 36 in. Typhoons occur between May and November, but are most frequent in July, August, and September; develop in the Pacific and sweep over the China Sea during the SW. monsoon. They affect the Philippines as far S. as Mindanao.

The surface is mountainous, three ridges, partly submarine and partly submerged, connect with the Borneo and Celebes islands, and are continued N. through the Philippines; loftiest peaks yet known, volcano of Apo, in Mindanao, 10,312 ft.; Malindag, also in Mindanao, 8,560; Halion, in Mindoro, 8,850; Mayon, or Albay, in Luzon, 8,274. Extinct craters are numerous; active volcanoes include Bulusan and Mayon, in S. Luzon, the latter the most destructive in the archipelago. The plains are alluvial districts on the middle and lower courses and at the mouths of the rivers. The alluvial districts are of considerable extent, particularly in Luzon, whose broad, low plains N. of Manila, between the coast mountain ranges, are very productive. The islands are well supplied with rivers, small streams, and lakes. Laguna de Bay (Bay Lake), which nearly bisects Luzon, 25 by 21 m., has as its outlet the Pasig River, 12 m. long, which enters Manila Bay through the city. Largest river, the Cagayan, or Rio Grande, in Luzon, 200 m.; other important rivers of Luzon, the Abra, Agno, and Pampangan; longest rivers of Mindanao, the Agusan, or Butuan, and Pulangui, or Grande de Mindanao, the latter navigable for about 70 m. Hot springs are numerous. Earthquakes are sometimes very destructive. Soil very fertile, especially in the plains and valleys, but not more than a third of the land surface is in cultivation, much of it being covered with dense forests of valuable timber, gum, and dye woods. Chief products, sugar, rice, coffee, indigo, hemp, maize, cotton, tobacco, yams, sweet potatoes. Nearly all tropical fruits are grown. Mineral products include gold, found in many places; lignite, copper, lead, silver, iron, sulphur, marble, kaolin, rock salt, manganese, gypsum, petroleum, natural gas. Pearl fisheries exist in the Sulu Archipelago.

Industries include the manufacture of tobacco, cigars, and cheroots (chiefly at and near Manila), cord, rope, thread, cotton goods, sugar, copra, carriages, hats, umbrellas, cement, ice, and liquors. Iron foundries and machine shops, sawmills, stone cutting, woodworking, and other mills are numerous. Small ships for the coasting trade are built to some extent. In some villages of Luzon and Panay almost every family has a hand loom, and cotton and sailcloths, quilts, coverlets, etc., are produced in considerable quantities. Cotton rugs of handsome designs are made in some of the islands, and fabrics of hemp, silk, and pina, the fiber of the pineapple leaf, are also produced. Chief ports, Manila and Aparri, on Luzon; Iloilo, on Panay, and Cebu, on Island of Cebu. Chief exports, hemp, sugar, copra, tobacco, cigars, gums, and resins; imports mainly from the U. S., French India, Great Britain, China, British India, and Germany; exports, chiefly to the U. S. and Great Britain; value of imports for fiscal year 1911, $49,833,722; exports, $39,778,629; exports to U. S., $16,716,956; imports, $19,483,568. The dominant religion is the Roman Catholic. An independent Filipino church exists in Luzon. The Moros are Mohammedans, and there are pagan tribes. Manila has a university and a medical school connected with it; also a number of colleges under the various religious orders. English is taught in all the public schools (over 3,000) of the islands. A training school for teachers and industrial and trade schools have been established since American occupation.

The islands were discovered by the Portuguese navigator Magellan, 1521. Spain sent a number of expeditions to take possession of the islands, but all failed until 1565, when Philip II sent Miguel de Legaspi, who secured a foothold in Cebu, and later removed to Luzon, where Manila was founded, 1581. The coasts were gradually brought under the dominion of Spain, but the interior of the larger islands and some of the smaller ones were never subjected to her authority. For a long time the islands were attacked frequently by the Portuguese, who were jealous of the growing power of Spain in the Orient, and later by the Dutch, who wished to add the Philippines to their E. empire. None of these attacks, however, were of a formidable character, and Spain's most serious troubles with external enemies in the

Philippines were the invasion of the Chinese pirate Li Ma Hong, 1754, when he attacked the Spanish with a powerful fleet of nearly 100 war junks, but was finally defeated; and, 1762, when England captured Manila and held it, with the surrounding country, for two years, when, peace having been restored between the two countries, the territory was returned to Spain. The more civilized natives, including the half-breeds, were long greatly discontented with the government given them by Spain, and there were revolts from time to time, the most serious of which began August, 1896, and continued, with one slight interruption, until the end of the Spanish rule, brought about by the destruction of the Spanish fleet in Manila Bay, May 1, 1898, by an American squadron under Commodore (later admiral) Dewey.

A treaty of peace between the U. S. and Spain was signed December 10, 1898, and ratified by the Queen Regent of Spain March 17, 1899, and with the payment of $20,000,000, to which $100,000 was added for the islands of Cagayan and Sibutu, omitted in the treaty, the Philippines became a U. S. possession. The capture of Aguinaldo, March 23, 1901, was practically the end of the armed revolution, chiefly of the Tagals, against the American occupancy, which had been carried on with ever-decreasing success during 1899–1900. In March, 1900, Pres. McKinley appointed a commission, which arrived in Manila June 3d, to organize the civil government of the islands. On June 21st a proclamation of amnesty was issued, and in the following months many Filipinos took advantage of its provisions. On July 4, 1901, the military government was discontinued, excepting in such provinces as remained in insurrection, and William H. Taft, president of the commission, appointed civil governor June 22d, entered on his duties, not the least onerous of which was the separation of Church and State. In 1904 he was succeeded by Luke E. Wright, and he, 1906, by James F. Smith. A general election for delegates to the first Philippine Assembly was held July 30, 1907, and the Assembly began its sessions October 16th, following, Mr. Taft (then Secretary of War) being present at the opening ceremonies.

Phil'ippins, or **Starover'ski,** name of a sect of Russian origin settled since 1700 in E. Prussia and Lithuania. They reject oaths and the priesthood, refuse to do military service, rebaptize all converts from other sects, and have a celibate eldership. They cling persistently to the ancient liturgy of the Russian Church. There has since been a strong agitation for the independence of the islands.

Philippop'olis, capital of E. Rumelia, Bulgaria; on five granite hills near the Maritza (Xebrus) River; 86 m. WNW. of Adrianople; founded by Philip of Macedon; was capital of province of Thrace under the Romans; nearly destroyed by earthquake, 1818; scene of Turkish defeat by Russians, 1878; is in best Turkish rice district; has manufactures of silk, cotton, leather, tobacco; center of large trade in attar of roses, grain, tobacco, wool, and wine. Pop. (1900) 42,849.

Philippoteaux (fē-lē-pō-tō'), **Henri Emmanuel Félix,** 1815–84; French painter; b. Paris; pupil of Léon Coguiet, with whom he worked on the painting of "The Battle of Mount Tabor" for the Versailles Museum; adopted historical line; later painted several remarkable panoramas; of most important works there are in the S. Kensington Museum "Before the Battle of Fontenoy" and the "English Squares at Waterloo"; at Versailles, "The Chevalier Bayard defending the Bridge at Garigliano," "The Siege of Antwerp in 1832," and the "Battle of Montebello," 1859; at Luxembourg, "Louis XV on the Field of Fontenoy"; in Gallery of Marseilles, "The Last Banquet of the Girondins."

Phil'ips, Ambrose, abt. 1671–1749; English poet; b. Leicestershire; settled in London as a writer; associate of Steele, Addison, and their circle; wrote six "Pastorals," which appeared in Tonson's "Poetical Miscellany," 1709, along with others by Pope; produced on the stage three tragedies, "The Distressed Mother," "The Briton," and "Humphrey, Duke of Gloucester"; began, 1718, the publication of a serial paper, *The Free Thinker*, which attained great popularity; held important offices in Ireland.

Philis'tines, ancient people of Palestine, occupying a limited territory on the S. portion of the coast, bounded by the hilly regions of Dan, Ephraim, and Judah, and extending SW. to the confines of Egypt. The Hebrews were engaged in a perpetual conflict with them during the time of the later judges and the kings, against whom they generally maintained their independence. In the time of the Maccabees Philistia was subject to Syria. The leading Philistine cities were Gaza, Ashdod or Azotus, Ascalon, Goth, and Ekron. The religion of the Philistines resembled that of the Phœnicians, their principal deities being Dagon, Baal-zebub, and the goddess Derceto.

Phil'lips, Stephen, 1868– ; English poet and dramatist; b. Somerton, near Oxford; was for six years connected with a theatrical company, playing in the provinces and in Ireland; works include "Marpessa," "Eremus," "Christ in Hades," "Poems," and the plays "Paolo and Francesca," "Herod," "Ulysses," "Nero," and "Faust."

Phillips, Wendell, 1811–84; American orator; b. Boston, Mass.; son of John Phillips, first mayor of Boston; admitted to the bar, 1834; became an abolitionist of the Garrisonian school, 1836, and, 1839, relinquished law practice from unwillingness to observe the oath of fealty to the Federal Constitution. From that time till 1861 he was a prominent leader and the most popular orator of the abolitionists. In 1870 he was the temperance and labor reform candidate for Governor of Massachusetts, receiving nearly 20,000 votes. He long advocated woman suffrage, prohibitory liquor laws, and prison reform, and opposed capital punishment; delivered numerous popular lectures in most of the N. states, the more notable being those on "The Lost Arts" and "Tous-

saint l'Ouverture," and funeral eulogies on Theodore Parker and John Brown.

Philocte'tes, in Grecian mythology, son of Pœas and Demonassa; educated in archery by Heracles, whose bow and arrows he inherited from his father, Pœas, who received them from Heracles, because he had set fire to the pyre of that hero. Philoctetes started to Troy with seven ships, but having been bitten on the island of Chryse by a snake sent by Hera because of the service rendered to Heracles, he was abandoned on the island of Lemnos by his fellows, who could not endure the stench of his wound and his agonized wailings. He lay on Lemnos for more than nine years, when he was brought to Troy by Odysseus and Diomedes, or Neoptolemus, because an oracle had declared that Troy could not be taken without the arrows of Heracles. He was healed by Machaon, killed Paris, and Troy was taken.

Phi'lo Juda'us, abt. 20 B.C.–50 A.D.; Jewish philosopher; b. Alexandria; headed a Jewish embassy to Caligula, and his son married a daughter of King Agrippa; endeavored to reconcile the philosophy of Plato with the Mosaic records, allegorizing the narratives of the Scriptures in a peculiar way; in his doctrine of the Logos and of the ideal and archetypal world, anticipated the speculations of the Gnostics.

Philol'ogy. See LANGUAGE.

Philome'le, in Grecian mythology, daughter of Pandion, King of Athens, and sister of Procne, the wife of the Thracian king Tereus, who lived at Daulis, in Phocis. Tereus loved Philomele, and having concealed Procne in the country that he might lie with Philomele when she came to visit her sister, he accomplished his purpose, and having cut out the tongue of Philomele, that she might not inform against him, announced to Procne that her sister was dead; but Philomele, having discovered the truth, wove the story of her wrongs into a mantle and sent it to Procne. The two sisters then killed Itys, the son of Tereus by Procne, and served him up to Tereus for dinner. The sisters fled, Tereus pursued, and when he had overtaken and was about to slay them, the gods, at the prayer of the sisters, turned all three into birds; Procne into the swallow, Philomele into the nightingale, and Tereus into the hoopoe.

Philopœ'men, abt. 252–183 B.C.; Greek general; b. Megalopolis, Arcadia; contributed to the victory of Antigonus Doson at Sellasia, 221; was made commander of cavalry of the Achæan League, 210, and, 208, strategus or commander in chief; repeatedly defeated the Spartans, and on the murder of Nabis, their tyrant, induced them to join the League. In 189, the party hostile to him having gained the supreme power in Sparta, and dissolved the connection with the League, he marched into Laconia. Sparta submitted, and was treated with great rigor; but the Romans compelled the granting of a general amnesty and the restoration of political exiles. In 183 he was elected strategus for the eighth time. In an expedition against Messene, which had dissolved its connection with the League, he fell into the hands of the enemy, and was thrown into a dungeon by Dinocrates, the Messenian leader, and forced to take poison.

Philos'ophy (Greek, "love of wisdom"), a term first brought into general use by Socrates. Philosophy deals with the general principles which form the basis of the other sciences. It follows up the data of experience to their ultimate grounds, regarding each particular fact in relation only to a final principle, and as a determinate link in the system of knowledge. Philosophy may be defined as the science of principles.

The history of philosophy may be treated as commencing with the Greeks. Thales, abt. 600 B.C., stands at the head of the Ionian school, which, with the Eleatic school, was the chief representative of speculative thought in pre-Socratic times; the former of these schools being characterized by Aristotle as seeking to find a material, the latter a formal principle of all things. The material principle sought by the Ionian school was assumed to be water by Thales, a primitive infinite but undetermined matter by Anaximander, and air by Anaximenes. The Pythagoreans substituted a symbolic principle—number—for the sensuous principle; but the Eleatics conceived of pure being as the one sole substance, the phenomenal world being viewed as unreal. The three great philosophers of this school are its founder Xenophanes, Parmenides, and Zeno. The transition from abstract to concrete being, from the Eleatic principle of unity to the world of phenomena, was attempted by Heraclitus abt. 520 B.C., who asserted for an absolute principle the unity of being and nonbeing—becoming. According to him all things are in constant flux, the product of conflicting opposites, of the One at once warring and harmonizing with itself. Empedocles, 440 B.C., in attempting to solve the reason of this flux, held that matter was the principle of permanent being, while force was the principle of movement, the two moving forces being love and hate. According to the Atomists, who are represented by Leucippus and Democritus, 450 B.C., the moving forces became an unintelligible necessity giving form to the world. Anaxagoras, born abt. 500, asserted reason as the principle, and though he did not develop his theory to any extent, the mere expression of a spiritual principle is sufficient to mark it as forming an era in philosophy. In the hands of the Sophists this principle became the occasion of their denial of all objective reality. In Socrates, 470–399 B.C., who united scientific method and a high ethical and religious spirit, the destructive teaching of the Sophists found its keenest opponent. What are called the minor Socratic schools—the Cynics, Cyrenaics, and Megarians—severally professed to regard Socrates as their founder, the Cynics, however, defining the end of action as self-sufficiency, the Cyrenaics as pleasure, and the Megarians as reason. With Plato (430–347)

philosophy lost its one-sided character. Though professedly a disciple of Socrates his system of idealism is his own. The Platonic idea is the pure archetypal essence, which is the source of all the finite realities that correspond to it. The visible world is an inferior reproduction of the world of pure ideas, where shine in all their splendor the good, the true, and the beautiful. In logic Plato brings back science to general ideas. In ethics the highest end of man is regarded as the unity of his nature. Plato's ideal theory is criticised by Aristotle, because he gives no real explanation of the connection between the phenomenal and the ideal. In Aristotle's own system, instead of beginning with the general and the absolute, as Plato had done, he begins with the particular and individual. His whole philosophy is a description of the given and empirical; and his method is induction. His system is a number of coördinate sciences, each having its independent foundation, but no highest science which should comprehend them all. The three schools of Greek philosophy which followed the systems of Plato and Aristotle, and which mark the declining days of Greece, are those of the Stoics, Epicureans, and Sceptics.

Rome had no philosophy properly its own; the universal character of Roman philosophizing was eclecticism, of which Cicero was the most illustrious representative. In Alexandria Eastern and Western philosophy, as also Judaism, Christianity, and paganism, came into contact. Neo-Platonism, founded by Ammonius Saccas, 193 A.D., strove to combine, in opposition to Christianity, the chief elements of classical and Eastern speculation. Hellenic ideas were mingled with a vague symbolism, and with theories of ecstasy and divine union. Christianity, in the apologists of the second century and the Alexandrine fathers, related itself very early to the philosophy of the time, but not until about the eleventh century did there begin to manifest itself a distinctive Christian philosophy in Scholasticism, which, assuming the dogmas of the Church to be absolutely true, sought to justify them to the reason.

Modern philosophy, which begins with the fifteenth century, is characterized by a freer, more independent spirit of inquiry. First the scholastic philosophy was attacked by those who called to mind the ancient Greek philosophy in its original purity. After this struggle new views were presented. Bacon and Locke on the one hand and Descartes on the other stand respectively at the head of the two systems—empiricism and idealism, which begin modern philosophy. Bacon created no definite system of philosophy, but gave a new direction to thought, the empiricism which he founded finally developing into skepticism. The system of Descartes was opposed by Gassendi, and received modifications at the hands of others, especially Malebranche. The most important successor of Descartes was Spinoza, who reduced the three Cartesian substances to unity, to one infinite original substance, the ground of all things, that excludes from itself all negation or determination, and is named God or nature. Locke, 1632–1704, who had a precursor in Hobbes, 1588–1679, the influence of whom chiefly concerned the history of political science, is regarded as the father of modern materialism and empiricism. Occupying the general position of Locke were Isaac Newton, Samuel Clarke, William Wollaston, the Earl of Shaftesbury, and Francis Hutcheson. The philosophy of Locke received a further development in France, where Condillac sought to explain the development of humanity by the simple development of the sensations. Then followed the materialism of Helvetius, d'Halbach, La Mettrie, and others, including several of the Encyclopedists. In opposition to this materialistic tendency arose the idealism of Leibnitz and Berkeley. The theories of Leibnitz were systematized by Wolff, and from his time to Kant German philosophy assumed no new standpoint. Berkeley, 1684–1753, founding on Locke's principle that we are percipient of nothing but our own perceptions and ideas, argued that the existence of bodies out of a mind perceiving them is impossible, and a contradiction in terms. Granting the premises of Berkeley, his conclusions could not be refuted; but it was reserved for Hume to trace out the ultimate consequences of the Cartesian and Lockian philosophy by a sort of *reductio ad absurdum*, and to produce the great metaphysical revolution of which Reid and Kant were the first movers. The Scottish or "common-sense" school of philosophy, with Reid, 1710–96, at its head, has the merit of having first strongly inculcated the necessity of admitting certain principles independent of experience, as the indispensable conditions of thought itself. Reid directed his inquiries to an analysis of the various powers and principles of our constitution, in order to discover the fundamental laws of belief which form the groundwork of human knowledge. Dugald Stewart, with some deviations, followed in the track of his master; but Thomas Brown departed on many points of fundamental importance from Reid's philosophy. The same occasion that gave rise to the Scottish school also produced the philosophy of Emmanuel Kant. Kant, 1724–1804, who may be justly regarded as the father of the philosophy of the nineteenth century, sought to bring together into unity the one-sided endeavors of his predecessors in the realistic and idealistic schools. He took up a critical standpoint, and from it instituted an inquiry into the origin of our experience or cognition. The ablest opponent of the Kantian philosophy, Jacobi, took the standpoint of faith in opposition to that of criticism, in order to give theoretic certainty to the postulates of the practical reason. In the hands of Fichte the critical idealism of Kant becomes absolutely subjective idealism. "All that is, is ego," this is the principle of the Fichtian system; the world is a phenomenon, perception is a dream. Fichte's subjective idealism found its continuation in the objective idealism of Schelling and the absolute idealism of Hegel. Schelling, 1775–1854, started from the ego of Fichte, and by a combination of the doctrine of the ego with Spinozism transformed it into the system of identity. Object

and subject, real and ideal, nature and spirit, are identical in the absolute, and this identity we perceive by intellectual intuition. Schelling developed a cyncretistic doctrine which constantly approximated to mysticism. Hegel, 1770–1831, developing this principle of identity, created the system of absolute idealism, elevating consciousness to the standpoint of absolute knowledge, and systematically developing the entire contents of this knowledge by means of the dialectical method. Schleiermacher, 1768–1834, promulgated an eclecticism to which Plato, Spinoza, Kant, and Schelling were the chief contributors. Schopenhauer, 1788–1860, developed a doctrine which may be described as a transitional form from the idealism of Kant to the realism at present prevalent. In opposition to Fichte's subjective idealism, and to Schelling's renewed Spinozism, Herbart, 1776–1841, developed a philosophic scheme on the basis of the realistic element in the Kantian philosophy, as also of Eleatic, Platonic, and Leibnitzian doctrines. After the death of Hegel, Feuerbach, Richter, Strauss, Arnold Ruge, and others developed, in an extreme manner, Hegelian thought, and recently Hegelianism has counted more adherents than any other system. Next to it has stood the Herbartian school; and more recently the modification of systems through a return to Aristotle or Kant, and the study of philosophy upon its historic side, have occupied the larger number of minds. While resting in part upon the basis of the doctrines of earlier thinkers, Trendelenburg, Lotze, and others have advanced in new and peculiar paths.

In France two philosophical tendencies opposed the sensualism and materialism so universal at the beginning of last century. Of these, the one was theosophical and the other found expression in the eclectic and spiritualistic school founded by Royer-Collard as the disciple of Reid, and further built up by Cousin, who incorporated into its body of doctrines a number of German philosophical notions. Jouffroy attempted to unite the philosophy of his predecessor Maine de Biran to that of the Scottish school, and became associated with the spiritualistic school, to which also belong the names of Garnier, Janet, Rémusat, Franck, Jules Simon, and others. This school has contended valiantly against the pantheistic tendencies of the age. Independent systems are those of Pierre Leroux, Lamennais, Jean Reynaud, and Buchez. Materialism has its supporters in Cabanis, who sees in thought only a secretion of the brain, Broussais, Gall, and others. Positivism, founded by Auguste Comte, numbers not a few followers.

In Great Britain the Scottish school had later exponents in Sir James Mackintosh, 1765–1832, and Sir William Hamilton, 1788–1856, who was largely influenced in some points of his psychology by Kant. Mansel was his disciple. Ferrier, 1808–64, assumed a polemical attitude toward the common-sense school in respect of its fundamental peculiarity of absorbing philosophy into psychology, as well as on minor details of the system. The associational psychology of Hartley, Priestley, and Dr. Darwin found representatives in the nineteenth century in James Mill, 1773–1836, and his son John Stuart Mill, 1806–73, who make the principle of association the sole explanation of psychical phenomena. Bain, Grote, and Lewes followed more or less in the same track. Herbert Spencer attempted to widen the psychological principles of the associational psychology into a universal doctrine of evolution. Among the chief leaders of philosophic thought opposed to the English school of empiricism may be mentioned the names of the late T. H. Green, Hutchison Stirling, and Edward Caird. In this country philosophy has been prosecuted more as an applied science, and its special relations to morals, politics, and theology. Speculation here has been widely influenced by Scottish philosophy. Among the best-known names of philosophical writers are those of Jonathan Edwards, Henry P. Tappan, Thomas C. Upham, Francis Wayland, and others. See ETHICS; MORAL PHILOSOPHY; NATURAL THEOLOGY; PSYCHOLOGY.

Philos'opher's Stone. See CERCANUM.

Philos'tratus, name borne by four Greek sophists of the same family of Lemnos: (1) The eldest PHILOSTRATUS, son of Verus, lived under Nero and wrote the dialogue of that name, preserved among the writings of Lucian. (2) The next, FLAVIUS PHILOSTRATUS, the elder, a descendant of Verus, flourished under Alexander Severus, 222–235 A.D., and composed, among other things, the "Lives of the Sophists," and a remarkable romance, "The Life of Apollonius of Tyana," much used as an offset to the life of our Savior. (3) The third PHILOSTRATUS, son-in-law of Philostratus II, wrote a series of descriptions of paintings; and (4) a fourth PHILOSTRATUS wrote a second series in imitation of the first. The works of these various Philostrati are of great importance for an appreciation of the periods to which they belong.

Phil'ter, aphrodisiac preparation, or love potion. Philters were much used in ancient Greece and Rome, and the Thessalians had special eminence in their preparation. From the accounts which have come down to us, many of their ingredients were harmless, or at most disgusting, and used on account of some purely fanciful efficacy; while others, it would seem, were violent poisons. The use of these potions is prevalent in almost all barbarous and half civilized lands.

Phin'tias, correct form of Pythias. See DAMON AND PYTHIAS.

Phips, or Phipps, Sir William, 1651–95; Governor of Massachusetts; b. Pemaquid, now Bristol, Me.; removed to Boston, where he worked as a ship carpenter, and later engaged in commerce; went, 1684, to England, and obtained means to fit out a vessel to recover the silver of one of the Spanish Plate fleet wrecked off the Bahamas, but was not successful until 1687, when he obtained treasure worth $1,500,000 (some accounts say $3,000,000), for which he got about $80,000, besides receiving knight-

hood and the office of high sheriff of New England. He headed, in 1690, an expedition which captured Port Royal, Nova Scotia; in same year had command of a fleet which unsuccessfully besieged Quebec; was the first royal governor of Massachusetts, 1692–94; built the fort of Pemaquid, Me., 1692; put an end to the prosecutions for witchcraft by organizing a special court of magistrates for the consideration of the cases; died in London.

Phlebi'tis, inflammation of the coats of a vein. Phlebitis may occur in any part of the body from injury. Idiopathic or primary phlebitis occurs chiefly in the lower extremities, especially in the expansions of varicose veins. When a vein is inflamed its contained blood coagulates, adheres to the walls of the vessel; a local fibrinous mass or clot (thrombus) obstructs or wholly suspends the circulation. Œdema or dropsical swelling, evidenced by pitting upon pressure, may result from the obstructed circulation. Following childbirth, phlebitis occasionally occurs, usually in the lower extremities, probably resulting from absorption of septic matter. This painful condition is known as *phlegmasia alba dolens* (*i.e.*, painful white swelling), and popularly termed "milk leg." The treatment of phlebitis is by local antiphlogistics and internal administration of antiseptics and tonics with absolute rest of the part attacked, and prompt evacuation of collections of pus.

Phlegma'sia, term synonymous with *phlegmon, phlegmonous inflammation, pseudo-erysipelas, diffuse abscess,* and now usually replaced by *cellulitis* or *phlegmonous cellulitis,* denoting an acute inflammation of the subcutaneous cellular tissue, tending to suppuration, in which the pus formed has a tendency to become infiltrated through the tissues, instead of collecting into one place as in ordinary acute abscess. This variety of inflammation is always an expression of an infection by pyogenic or pus-forming bacteria, patients being made more liable thereto by exposure, alcoholic excess, wasting disease, etc. It sometimes results from mortifying shreds of tissue in wounds, and complicating injuries, but in by far the greater number of cases it arises spontaneously in debilitated individuals—persons suffering from malassimilation, and consequently having a thin and impoverished blood, *i.e.*, blood which is incapable of producing a healthy inflammatory action. In such individuals it generally occurs in the extremities, especially in the fingers and hands. The symptoms of phlegmasia are those of ordinary inflammation somewhat aggravated.

Phle'gon of Tralles in Caria, Greek historian; freedman of the Emperor Hadrian, and author of a much-read historical compend in sixteen books called "Olympiads," of which several chapters have been preserved.

Phlox (flŏks), genus of a few annual and nearly thirty perennial herbs of the family *Polemoniaceæ,* all but one Siberian species N. American. The phloxes cultivated in flower gardens are mostly artificial varieties of *Phlox paniculata, maculata, drummondii,* and *subulata,* all natives of the Atlantic U. S. and Texas.

Drummond's Phlox.

Phocæa (fō-sē'ă), extreme N. of the twelve ancient Ionian cities of Asia Minor; founded by the Athenians on the Erythrean Cape, 200 stadia NW. of Smyrna. Remarkable for maritime enterprise, its inhabitants were first of the Greeks to build fifty-oared galleys and to undertake distant voyages, traversing the Adriatic, Tuscan, and Black seas. Attacked by Harpagus, general of Darius, the Phocæans abandoned their city rather than submit, and after long wanderings reached Gaul and founded Marseilles. Their abandoned city attracted colonists, again became rich and powerful, and desperately resisted the Romans. In the Middle Ages the Genoese founded a city, Phocæa Nuova, on the same spot, and with their ships aided the Ottomans against the Greeks. The present insignificant village of Phokia occupies the ancient site.

Phocas (fō'kăs) **I,** Byzantine emperor (602–610); originally a groom in Cappadocia, then a common soldier, and finally general; made emperor by the rebellion which deposed Mauritius. Brave before accession though always sanguinary, on the throne he became tyrannical and timid as if demented; was unsuccessful in war against Persia, whose armies marched to Chrysopolis (Scutari). Abhorred as a monster, he was deposed by the people, and put to death with frightful mutilations.

Phocas II (Nicephorus), Byzantine emperor (963–969); before his accession conquered Crete from the Saracens (962), and was decreed a triumph; proclaimed emperor by the people shortly after the death of Romanus II; successful against the Mussulmans in Asia Minor; captured Aleppo and Antioch; made intimate alliance with Sviatoslav, Prince of Kief, and in subsequent wars was victorious throughout Armenia and Mesopotamia. At the height of his successes was betrayed by

his wife Theophania, and assassinated by her paramour.

Pho'cidæ, family of pinniped mammals belonging to the order *Carnivora*, and containing the earless or hair seals. With the exception of one genus (*Monachus*) all are inhabitants of the frigid and colder portions of the temperate zones.

Phocion (fō'shĭ-ŏn), abt. 402–317 B.C.; Athenian general; commanded with great success against Philip II of Macedon in Eubœa, Megara, Byzantium, and other places; in politics sided with the Macedonian party; was an unrelenting adversary of Demosthenes; after death of Antipater became implicated in the intrigues between Cassander and Polysperchon, fled to Phocis, was delivered to the Athenians, and by them condemned to take poison, and his corpse was hurled unburied across the frontier. One year later the Athenians raised his statue and erected a fine monument in his honor.

Phocis (fō'sĭs), ancient division of Greece in Hellas proper; was bounded S. by the Corinthian Gulf, E. by Bœotia, N. by Doris, and W. by Locris; was almost entirely covered with the famous mountain range of Parnassus; NE. part traversed by the Cephissus River, which formed a beautiful valley; Delphi, Elatea, and Cirrha were its principal towns. It derived its chief interest from the famous oracle of Delphi situated in its territory; but this circumstance became at last the cause of its ruin. A verdict of the Amphictyonic Council ordered the Phocians to pay a fine for having used a tract of land which belonged to the oracle. When the Phocians refused to pay, a ten-years' war (355–346 B.C.) broke out, in which they fought bravely, maintaining themselves by the treasures of the temple; but at last they were conquered, chiefly by the strategy of Philip of Macedon, and then their twenty-two cities were destroyed, and they were scattered in villages, of which none was allowed to contain more than fifty houses.

Phœbe (fē'bē), surname of Diana (Artemis) as goddess of the moon. See DIANA.

Phœbe Bird. See PEWEE.

Phœ'bus, epithet of Apollo as god of the sun. See HELIUS.

Phœnicia (fĕ-nĭsh'ă), name given by the Greek and Roman writers to the narrow region between the hills of N. Palestine and the Lebanon Mountains of Syria on the E. and the Mediterranean on the W. By the Phœnicians themselves their country was called K'na'an (Canaan), lowland. Its N. boundary in a political sense was near Aradus in lat. 34° 52′ N., and its S. boundary S. of Mt. Carmel, about lat. 32° 30′; length was about 180 m.; general breadth from 10 to 12 m., including the mountain slopes; area, less than 2,000 sq. m. The principal towns, proceeding from N. to S., were Aradus, Tripolis (now Tarabulus), Byblus (Jebail), Berytus (Beyrout), Sidon (Saida), and Tyre (Sur). The cities of Phœnicia were governed each by a king, and each with its adjacent territory constituted a sovereignty. In Tyre, and probably also in Sidon and the other principal cities, a powerful aristocracy existed along with the monarchy. At Tyre, when the throne was vacant, the place of the sovereign was occupied by elective magistrates called *soffets*, or judges. A large part of the population of Phœnicia was composed of slaves, brought from all parts of the ancient world. The cities were never united under a single monarch, but Sidon and Tyre successively exercised controlling power. The chief defense of the Phœnicians was their naval strength; when threatened by land they employed mercenary troops.

The Phœnicians appear on the coast of Syria at the earliest dawn of history. Herodotus says they came from the Erythræan Sea. Accepting this view, Schrader supposes that the Phœnicians once occupied the coasts of Arabia and Persia, and, trafficking with the principal cities of Babylonia, followed the course of the Euphrates and Tigris, and crossed over to the Mediterranean coast by the usual road across Palmyra. According to Rawlinson and others, the Canaanites and Phœnicians were distinct races, the former the original occupants of the country, and the latter immigrants at a comparatively recent date. The original inhabitants of Phœnicia were probably Hamites, as stated in Genesis; but on being surrounded by Aramæans and Hebrews, or overpowered by Semitic immigrants from the shores of Arabia, they gradually adopted the Semitic tongue, and forgot their own. In the Mediterranean they took possession of Cyprus, Rhodes, Cythera, Thasos, where they had valuable gold mines, and Samothrace, which from them received its peculiar worship. In Crete they established the colonies of Itanus and Lampe. They seized Malta, and all the promontories of Sicily, in which they founded Eryx and Panormus (Palermo). The coasts of Sardinia were dotted with their settlements, they were in mercantile connection with the towns of Etruria. Corsica and the Baleares served as stations for the trade with Spain, of which they occupied the SW. portion, including Tartessus (Tarshish) and Gades (Gadira, Cadiz). Their factories in S. Gaul grew into important cities.

The shores of N. Africa were early visited and peopled by them. Long before founding Carthage they had there the trading posts of Leptis Magna, Cirta, Utica, Hippo, and others. On the Atlantic coast a series of towns extended down to the Lixus. The intercourse and intermixture with the Libyans gave rise to the Libyo-Phœnician race. It is not known how far they penetrated into the interior of Africa, but there are good reasons for supposing that they reached Timbuktu and the Niger, and possibly Lake Tchad. Commerce with E. Asia was carried on principally by caravans. By way of the Red Sea the Phœnicians visited the E. coasts of Africa, and probably E. Asia, making expeditions to Ophir. They visited also the Black Sea and the Sea of Azov. It is disputed whether they went by sea to the British islands and other parts of N. Europe, or obtained tin, amber, and other

products of those regions from the trading posts in the interior of the continent. The commerce of Phœnicia reached its height about the eighth century B.C.; with the advent of the Greeks after Alexander's conquests Phœnicia began to lose her importance; and her independent existence ended with the absorption of all of Syria and Palestine into the Roman Empire.

Phœnicopter'idæ. See FLAMINGO.

Phœnix (fē'nĭks), capital of Arizona and of Maricopa Co.; on Salt River; 226 m. NE. of Yuma; in agricultural, stock-raising, and gold and silver mining region, and has iron works, machine shops, and large trade with the interior. Pop. (1910) 11,134.

Phœnix, mythical bird living in Arabia, resembling an eagle, with wings partly red and partly golden. On arriving at the age of five hundred years it built a funeral pile of wood and aromatic gums, and, lighting it by the fanning of its wings, was consumed to ashes, out of which arose a new phœnix. The act was repeated every five hundred years.

Phonet'ics, science of articulate sounds. Articulation depends on the organs of speech. Every articulation is founded on an expulsion of breath, and sounds differ according to the number and character of the obstacles encountered by a breath in the course of emission. Max Müller framed the following scheme of a physiological consonant alphabet:

Places.	Breaths.			Checks.		
	Hard.	Soft.	Trilled.	Hard.	Soft.	Nasal.
Glottis	' as in hand	' as in and				
Root of tongue and soft palate	'h " loch	'h " *Tage* (G.)	r	k (kh)	g (gh)	n (ng)
Root of tongue and hard palate	'y " *ich* (G.)	'y " yea		ch (chh)	j (jh)	ñ (ny)
Tip of tongue and teeth	s " rice	s " to rise	l	t (th)	d (dh)	n
Tongue reversed and palate	ş " sharp	ş " pleasure	r	ṭ (th)	ḍ (dh)	ṇ
Tongue and edge of teeth	th " breath	dh " breathe				
Lower lip and upper teeth	f " life	v " live				
Upper and lower lips		w " *Quell* (G.)		p (bh)	b (bh)	m
Upper and lower lips rounded	'w " which	'w " with				

Pho'nograph, instrument for recording and reproducing sound. In 1877 Thomas A. Edison applied to a telephone disk a style which pressed on a strip of tinfoil, his object being the attainment of a self-recording telephone. Accidental motion of the indented foil under the style caused a momentary reproduction of the sounds which had actuated the telephone disk. This suggested his invention of the modern phonograph, which was first exhibited, 1878. To the telephone disk was attached a metal point, made to press gently on tinfoil, with which the cylinder was covered. Into the surface of the cylinder a spiral groove was cut, corresponding to the pitch of the axial screw. By motion of the metal point the plastic tinfoil was pressed into the groove beneath it, receiving thus a series of slight indentations, which constituted the registration of the exciting sound. When this line of indentations was made to pass under the metal point again the variable pressure thus given caused the disk to repeat the vibrations originally impressed on it by the voice.

Since 1886 Edison has improved the phonograph, adopting the use of a wax cylinder, with two separate mouthpieces, having specially prepared styles—one for transmitter, the other for receiver. The elastic disks are made of glass, and great improvement has been secured in distinctness of articulation, but with corresponding loss of loudness. From the receiving disk a pair of tubes are conveyed to the hearer's ears, or a metallic megaphone is connected with the receiving disk, transmitting the sound to a considerable distance. To secure the utmost regularity in speed of rotation an electric motor or clockwork is employed to actuate the wax cylinder. Its delicacy and accuracy in reproduction are very remarkable. Not only talking, but also whistling, singing, whispering, and the playing of any musical instrument whatever may be very perfectly repeated by it. In Berliner's gramophone, a modification of Edison's phonograph, instead of indentations a sinuous line is made; but this is traced on a horizontal revolving disk of zinc, covered with a thin coating of wax. The plate is then dipped into a solution of chromic acid, so that the line is etched into the zinc. Such a plate when passed again under the style gives lateral motion to this, which is communicated to the disk, resulting in very satisfactory articulate sound. This was later improved by making a permanent disk of hard rubber. The graphophone and so-called talking machines are variations of the phonograph. Aside from the purposes of entertainment, the phonograph is used in business as an aid to the stenographer and the typewriter. See GRAMOPHONE; GRAPHOPHONE; TALKING MACHINE.

Phonog'raphy, system of shorthand, invented by Isaac Pitman, of Bath, England, first published, 1837, and since greatly improved by the inventor and others. In England the only text-books of the art are those prepared or sanctioned by the inventor; but in the U. S. numerous versions or modifications are in use. In general, the twenty-four English consonant sounds are each represented by a simple straight or curved line, the requisite number of distinct characters to write them all being obtained by giving these lines four different directions. and by making them both light and heavy. The simple vowel sounds are written with a dot or a short dash placed to the con-

sonant signs, distinction between one vowel and another being secured by writing these signs to the consonants in three places, namely, at the beginning, at the middle, and at the end, and by making them heavy for the long and light for the short vowels. The four double vowels or diphthongs, the sounds of *i* in ice, *oi* in oil, *ow* in owl, and *ew* in new, are usually represented by small angles, placed in a similar way to the consonant stems. In writing a word in phonography, the consonants are all made first without taking off the pen, and the vowel signs are written in afterwards. In addition to the simple stems of the alphabet proper, provision is made for still further abridging the phonographic writing by means of compound signs formed from the original simple stems by the addition to them of various hooks, modifications, circles, and loops. Experienced phonographers omit generally the signs of the vowels in writing, it being found that with the aid of the context no trouble is found in reading the unvocalized consonant outlines. Both the brevity and legibility of phonography are promoted by the use of phrase writing, that is, by joining or embracing two or more words in one outline. See STENOGRAPHY.

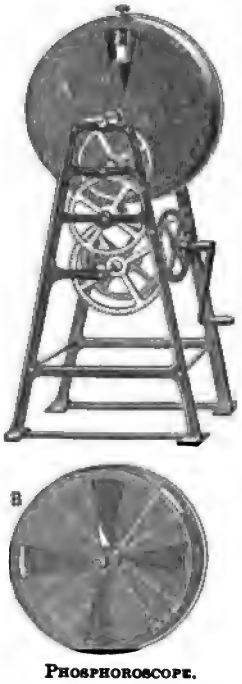
Phor'mion, Athenian general who distinguished himself in the wars with Samos, but especially at the siege of Potidæa, 432 B.C., where he fought with Perdiccas, King of Macedonia, against the Chalcidians. In 430 B.C. he led the Acarnanians against the Ambraciots; in 429 B.C. was victorious at Naupactus against the Peloponnesians, after which he once more commanded the Acarnanians.

Phos'phates. See PHOSPHORIC ACID.

Phosphores'cence, emission of light with little, if any, heat, and in most cases with little chemical change. Phosphorus emits light in the dark, and this is due to slow combustion, the change being of the same kind as that which takes place when phosphorus burns actively in the air. Phosphorescence is frequently observed to a marked degree in sea water. The phenomenon is connected with the presence of minute organisms from which the light is given off. The most interesting examples of phosphorescence are found in the glowworm and fireflies. Some substances have the power to emit light after having been exposed to a bright light. Prominent among these are the sulphides of calcium, strontium, and barium. According to Becquerel, phosphorescence is a power possessed by all substances, but in most cases it lasts only a short time. See FLUORESCENCE.

Phosphor'ic Ac'id, principal acid formed by phosphorus; occurs in nature mainly in calcium phosphate, the principal constituent of the ashes of bones; occurs also as phosphorite and, in combination, in the mineral apatite. It can be made (1) by burning phosphorus, which converts it into the oxide, and then boiling this in water solution; (2) by oxidizing phosphorus with nitric acid. On the large scale it is made from bone ash or phosphorite by treating with sulphuric acid, filtering, and evaporating. When its solution is evaporated to the proper consistency the acid crystallizes out on cooling in large crystals. This is called *orthophosphoric acid*, to distinguish it from two other varieties of the acid: *metaphosphoric acid*, formed when orthophosphoric acid is heated to 400° C. (750° F.), and *pyrophosphoric acid*, formed by heating orthophosphoric acid to 200°–300° C. (400°–600° F.). *Phosphates* are salts of phosphoric acid, or, more especially, of orthophosphoric acid. Phosphorus also yields two other acids: *phosphorous acid* (salts called *phosphites*) and *hypophosphorous acid* (salts called *hypophosphites*). Phosphoric acid is used as a tonic stimulant to digestion.

Phosphor'oscope, device invented by Edmond Becquerel for showing the phenomenon of phosphorescence in bodies which shine but for a very minute portion of time after their insulation. By suitable perforations in a disk revolving over a box in which is the substance to be examined, sunlight is allowed to fall on it and to be cut off before the observer can see it through another aperture. By giving to the disk a sufficiently rapid rotation observations may be made after an interval of less than $\frac{1}{100}$th of a second after light has ceased to shine upon the substance. In this way it has been discovered that many substances are phosphorescent—*i.e.*, capable of emitting light—which have never before been known to be so.



PHOSPHOROSCOPE.
A, Stationary cylindrical box. *B*, Four apertures of screens.

Phos'phorus, element discovered by Brandt, 1669, in the residue left on evaporating wine; made by first making from bones a soluble acid phosphate of lime through the agency of sulphuric acid, and mixing and distilling this with charcoal. Bone ash contains nearly 20 per cent of phosphorus; but the amount of phosphorus obtained in practice is only from 8 to 11 per cent. The process is expensively consumptive of fuel and destructive of apparatus, as well as of the health of the operatives, these facts much enhancing the cost of phosphorus; but the production is large. Commercial phosphorus is a yellowish body of waxlike consistence, and translucent; generally cast in sticks, which, on account of their dangerous inflammability, must be preserved under water, as it bursts into flame on slight friction and even when exposed to warm air; boils at 290°

C., forming a transparent vapor nearly four and a half times as heavy as air. Its slow combustion in the air makes it luminous in the dark. *Red phosphorus* or *amorphous phosphorus* is formed from ordinary phosphorus when the latter is long exposed to the light. There are two oxides of phosphorus: (1) Phosphorous anhydride (P_2O_3), a soft, white, readily volatile powder, formed by the slow oxidation of phosphorus in a limited supply of dry air; and (2) phosphoric anhydride, or phosphoric pentoxide, the product of the burning of phosphorus with flame in the air. In medicine, phosphorus in small doses acts as a powerful general stimulant, in large doses as a violent irritant poison. When not oxidized in the stomach it is absorbed into the system, probably dissolved in oily matter. Phosphorus is a direct tonic to nerve tissue and also produces bone, but it must be taken continuously and in small doses. Phosphorus is also administered in the form of the hypophosphites, such as lime, soda, and potash, and of iron, and also combined with iron in the form of pyrophosphate of iron. The hypophosphites have obtained celebrity as remedies in consumption, in combination with a generous and fatty diet; and the pyrophosphate of iron in conjunction with calisaya bark, as an elixir, is often used as a tonic.

Pho'tius, d. abt. 891; Byzantine prelate; Secretary of State to Emperor Michael III; on deposition of Ignatius, Patriarch of Constantinople, for opposing the court, 858, was installed his successor. Pope Nicholas I objected to his elevation as irregular, and convoked a council which deposed and excommunicated him, 862. Photius then gave the conflict a doctrinal turn, and the Council of Constantinople, 867, condemned and excommunicated Pope Nicholas I because of heretical views, thereby laying the foundation of the schism between the Eastern and Western churches. In 867 Photius was sent into exile and Ignatius reinstated; but after the death of Ignatius he returned, and was once more placed on the patriarchal throne. In 886 Leo the Philosopher exiled him, and he died in an Armenian monastery. Of his works, the chief is the "Myriobiblon," or "Bibliotheca," a collection of extracts and summaries of a large number of Greek authors.

Photo-engrav'ing, variety of processes in which the action of light and the use of certain chemicals supplant the work of the engraver. About 1826 Nicéphore Niepce, a Frenchman, discovered that bitumen, under certain conditions, became sensitive to light, losing solubility by its action. He coated a sheet of metal with bitumen dissolved in oil of lavender, exposed it under a drawing to the rays of the sun; the bitumen became insoluble in all those parts except where the lines protected it; the latter were then dissolved away with oil of lavender, and the metal thus laid bare was etched with an acid. Many modern processes are based on this action of bitumen, but in others different substances, rendered insoluble by light, are employed, being quicker in their action, although the finest results are still obtainable by the bitumen process. See PHOTOGRAVURE; THREE COLOR PROCESS.

Photog'raphy, art of producing permanent images or pictures by means of the chemical action of light. The first-known experiments in this line were made by Thomas Wedgwood, 1802, by treating paper with a solution of nitrate of silver and exposing it under some translucent material. When the sunlight struck the sensitized surface it was darkened, showing the design. Davy, working with Wedgwood, found chloride of silver more sensitive, but as no means of making these prints permanent were known, they were of little value. In 1839 attention was directed to the subject by the announcement in France of Niepce and Daguerre's invention for the fixation of the images of the camera obscura, and simultaneously in England of that of Mr. Talbot. In the former of these the material employed was a metallic tablet of silver-plated copper; in the latter, paper. The process of Daguerre is as follows: A tablet of silver-plated copper is carefully cleaned and polished. It is then exposed to the vapor of iodine. Talbot's invention of the calotype consisted in covering a sheet of paper with a changeable salt of silver, exposing it in the camera, and developing the latent image by a solution of gallic acid. The result was a negative—that is, a photograph in which the lights and shadows answer, respectively, to the shadows and lights of the original; while in a positive the lights correspond to lights, and the shadows to shadows. It had this advantage over Daguerre's, that it was capable of multiplication. Two other improvements on the daguerreotype process were soon after discovered. The first consisted in more perfectly fixing the picture and deepening its shades by the use of a salt of gold. The second consisted in the use of a much more sensitive preparation, the silver bromide, which diminished the time of exposure in the camera. The greatest improvement in photography, however, is due to F. Scott Archer, of England, who discovered the collodion process. This consists in coating a glass plate with a solution of gun cotton in alcohol and ether, containing some soluble iodide. The plate is then soaked in a solution of silver nitrate, in which there must have been dissolved as much silver iodide as the solution will take up. The iodides in the film thus become iodide of silver. The exposure is then made as in daguerreotyping, and the invisible image is developed by pouring upon the film a solution of pyrogallic acid. The image comes forth as a negative, and it is fixed by soaking it in hyposulphite of soda (hypo); the film is then thoroughly washed with water and dried. From this negative proofs on paper may be printed. This is called the wet collodion process. In the dry process the collodion film, after being carefully washed, is coated with some preservative, such as tannin, and then dried. In 1887 Rev. Hannibal Goodwin, of Newark, N. J., patented the photographic film. In this a sheet of transparent celluloid is substituted for the glass plate in the dry process. These films are made in lengths and wound on spools, and are placed

in the camera so that several consecutive negatives are made on one film by unwinding the same and exposing one portion after another.

The operation of printing from a negative is thus conducted. Paper of very uniform consistency is coated on one side with a thin deposit of albumen and silver chloride, conveniently produced by soaking the paper in ammonia chloride or chloride of sodium, and then laying it on the surface of a solution of nitrate of silver. Thus prepared, the paper is placed beneath a negative and exposed to the sun. The light transmitted through the glass in its transparent parts produces blackness in the paper, but those places corresponding to the black portion of the negative remain white in the proof, the intermediate shades being, of course, intermediately affected. Owing to the want of durability of photographs obtained by the aid of salts of silver, attempts have been made to substitute others not liable to change. Among the printing processes which depend on sensitive substances other than silver salts, the more important survivals are those employing potassium bichromate in gelatin or other sensitizer, the blue-print process, and the platinotype process.

In the *carbon* and *gum-bichromate processes*, gelatin containing bichromate is rendered insoluble in water by action of light and its "tackiness" destroyed, so that pigment mixed with the chromated gelatin is removed with the soluble portions during development (in water), leaving an image in pigmented gelatin. *Blue prints* are made on paper coated with a mixture of a ferrous salt, usually ammonio-citrate of iron, and ferricyanide of potassium. The image is developed and fixed by merely washing in water, which brings the reduction products into reaction, with the result that insoluble Turnbull's blue is formed and dissolves the unaltered salts, leaving a picture in blue on a white ground. This process is largely used on account of its cheapness and simplicity for copying plans, etc. In the *platinum* process the paper is coated with ferric and platinum salts. Light reduces the ferric to a ferrous salt, and this, when brought into solution by the developer (oxalate of potassium), reduces in turn the platinum salt, giving an image in platinum black. The platinotype is very soft and beautiful, and has the additional merit of being absolutely permanent. See CHROMOPHOTOGRAPHY.

Photography, Col'or, art of making photographs of objects in their natural colors. Many attempts have been made to accomplish this, but as yet no direct method has been obtained. The only efforts that have proved successful have been based on the trichromatic process of color analysis. Prof. James Clerk Maxwell suggested, 1861, a process which involved the production of three photographic images representing the analysis of all colors into three spectrum colors, thus constituting a color record, and the superposition of the three elements of the color record in the three simple colors, whereby the original colors are reproduced to the eye. Frederick C. Ives, of Philadelphia, Pa., 1888, perfected a process of color photography based on Maxwell's suggestion. By his method three negatives are obtained through red, green, and blue screens, from which three transparencies are made. These are placed in an instrument called the photochromoscope, so that each transparency is subjected to rays of the same color as the negatives were made by, and the combined images, being superimposed by reflectors, form one image, in the natural colors of the object photographed. This process has been used commercially by making three half-tone process blocks and printing by superimposed impressions from the same in inks of the colors through which the original negatives were made.

In 1907 a process was devised by MM. Lumière at Lyons, France, by which a film is made sensitive to colors by the use of a potato starch dyed in three colors. Exposure is made as usual, but with the plate reversed, so that the light reaches the sensitive emulsion, first passing through the covering of colored starch grains. The plate is then developed, and, without fixing, treated with an acid permanganate reducer, rinsed, and redeveloped. The result is a positive print in natural colors. See CHROMOPHOTOGRAPHY.

Photograv'ure. See PHOTO-ENGRAVING.

Photom'etry, process of measuring the intensity of light. Huygens used a tube having a small aperture at one end, in which was placed a minute globular lens which allowed the 27,664th part of the sun's disk to be seen. This fraction of his light being equal in brightness to the star Sirius, Huygens concluded that the distance of Sirius from the earth was 27,664 times as great as that of the sun. Bouguer's photometer compared the reflecting powers of two different surfaces by having the image of one reflected in a mirror placed in a line with the other surface and the eye of the observer. The two reflecting surfaces had a light placed between them, which was moved from one toward the other until the reflection of the one in the mirror was equal in intensity to the direct light from the other. The photometer of Bouguer was modified by Ritchie so that a comparison of sources of light could be made, as well as the reflective powers of surfaces. Rumford's photometer employs the principle of comparing the depth of shadows, and consists of a vertical staff placed a short distance in front of a screen of tissue or oiled paper. The shadows may be compared in front, or on the back side of the paper, the latter method being preferable because the back of the paper may be in a darkened chamber, thus allowing the eye to be undisturbed by the glare of the lights.

Bunsen's photometer consists of a screen of thin writing paper stretched on a frame and marked with a grease spot. If a light is placed on each side of the paper, the spot viewed from the side of strongest light will appear darker than the surrounding space; from the other side, lighter. When the light falling on each side of the paper is equal, the spot and the surrounding surface will present the same shade, and the squares of the distances of the sources

of light will, respectively, indicate their intensity. A modification of this instrument by Dr. Letheby found much use in gas works. Among late improvements in the photometer, that of Messrs. Lummer and Brodhun possesses a higher degree of sensitiveness than those described. In it rays from the two sources are reflected obliquely from the direction of the photometer bar so as to make an angle of 90° with one another and of 45° with the bar. At the point in which they cross each other a pair of rectangular prisms, cemented together, are placed. These would form a complete cube with faces perpendicular to the two rays were it not that a portion of the left-hand prism is cut away. The result is that a bundle of rays from the observer's right enters the prism, one portion passing through, the other being totally reflected. There are also chemical photometers, which depend on the decomposing action of light. Among the earliest experiments in this direction were those of Dr. John W. Draper, who obtained his results by determining the amount of hydrochloric acid formed in a given time from the union of its gaseous elements under the influence of light. Bunsen and Roscoe extended these experiments, and produced an instrument on the same principle capable of most delicate measurements.

Phranza (frăn'zā), or **Phran'zes, George,** 1401–78; last of the Byzantine historians; was chamberlain of Manuel II, Palæologus. At siege of Patras, 1429, he saved the life of Constantine, afterwards emperor, but was himself taken prisoner; at capture of Constantinople by Mohammed II his entire family were made slaves; but he and his wife escaped to Sparta and thence to Corfu, whence he conducted diplomatic negotiations. Finally he retired to the monastery of Tarchaniotes, where he wrote his valuable "Chronicon," or Byzantine history.

Phrenol'ogy, the so-called science of mental faculty as exhibited in the shape, size, and contour of the skull. This mode of investigating the mental capacities of individuals rose into prominence through the "systems of phrenology" of Franz Joseph Gall (1758–1828) and Kaspar Spurzheim (1776–1832). As a method by which the external examination of the "bumps and hollows" of the skull is made to reveal the intellectual and emotional gifts of particular men—so considered, the whole scheme is now known to be worthless. The only semblance of justification it has is found in the facts of brain localization; but this extends only to the senses and movement, and shows all men to be alike in their localizations. It gives no ground whatever to the elaborate pretense of the "phrenologists" to describe character. It is possible that morphology may some day show that certain ratios in skull measurements may, in the process of evolution, have come to have some significance for mental faculty in great averages, but even that is forbidden to us in the present state of anthropometric research. See SKULL.

Phryg'ia, province in W. half of peninsula of Asia Minor, whose boundaries varied greatly in different epochs. The Phrygians emigrated from Macedonia and founded a powerful empire, whose capital was on a hill across the gulf from Smyrna; now called Tantalis, or city of Tantalus. Later the Phrygians secured a large portion of the Hittite Empire, and removed their capital into the interior. This was the city of the Midases and the Gordiuses.

Phryne (frī'nē), Athenian courtesan, of the latter part of the fourth century B.C.; was of humble birth, but her transcendent beauty attracted rich admirers, and she acquired great wealth. Praxiteles modeled from her the Cnidian Venus, and the picture of Apelles called "Venus Anadyomene" is said to have been taken from Phryne.

Phrynichus (frĭn'ĭ-kŭs), one of the framers of Attic tragedy, the first to bring female characters on the stage, and the first to develop a true dialogue; best remembered by his sweet and graceful melodies, sung as late as the time of Aristophanes. The most famous of his pieces was the "Phœnician Women," brought out with great splendor by Themistocles, 476 B.C., to commemorate the victory over the Persians. An earlier piece, "The Capture of Miletus," is memorable for the story told by Herodotus that the audience was so moved by the representation of the sufferings of their kindred that they burst into tears, and the poet was fined 1,000 drachmæ.

Phthalic (thăl'ĭk) **Ac'id, Alizar'ic Acid,** or **Naphthal'ic Acid,** acid obtained first, 1836, by Laurent by boiling naphthalene tetrachloride with nitric acid; distilled with lime it yields benzene benzoate and calcic carbonate. By distillation it yields *phthalic anhydride,* which, when heated with resorcin, produces fluoresceĭn. FluoresceĭN is of importance as a basis for the preparation of the beautiful dye called *eosin.* Other dyestuffs, also called *phthalic-acid colors,* are made by heating phthalic anhydride with substances belonging to the class of phenols. Phthalic-acid colors are among the most brilliant of the artificial dyes.

Phthisis (thī'sĭs). See CONSUMPTION; TUBERCULOSIS.

Phyc'ophites, or **Phycoph'yta,** branch of the vegetable kingdom in which the result of the sexual union of two cells is the formation of a single "resting spore" (zygospore or oöspore). Phycophites are the lowest plants which exhibit sexuality, and by this they are easily separated from the *Protophytes.* They are distinguished from the *Carpophytes* by the simple spore which results from the sexual act, in contrast with the many-celled "fruit" of the higher group.

Phylacteries (fĭ-lăk'tĕr-ĭz), properly, amulets worn to protect the person from evil influences. In the New Testament the name is given to the leather cases containing, on fine parchment, the four passages, Ex. xiii, 1–10; xiii, 11–16; Deut. vi, 4–9; xi, 18–21. They are fastened by leather straps to the forehead and the arm, and also to doorposts and the like. The custom has been maintained from very

ancient times by the Jews, and is based on a literal interpretation of Ex. xiii, 9, 16; Deut. xi, 18.

Phylæ (fī'lē), tribes into which ancient Attica was divided; number originally four, but after expulsion of the Pisistratidæ was raised to ten by Cleisthenes; two more were added in honor of Antigonus and his son Demetrius. At the head of each tribe was a phylarch, who superintended the registering of the members of the *phyle*, organized the choirs for the festivals, presided over the communal assemblies, and commanded the contingent of cavalry. Afterwards, however, the office was divided, the phylarch retaining only the military duties, while the civil duties were transferred to a new office, that of the *epimeletes*. To the Athenian Senate each phyle sent fifty members.

Phyllop'oda, lowest or most primitive group of *Crustacea*, embracing segmented forms provided with numerous (ten to sixty, or more) pairs of leaflike feet. In some the segments are easily seen in the anterior region of the body; in others this portion is covered by a "carapax" formed by a duplication of the skin, which either covers the body like a scale, or is folded so that it forms a bivalve shell, in which the body can be entirely retracted. To the naturalist these are interesting as being probably the stock from which all other crustaceans are descended. Most species live in fresh water, but some are found in strong brine, as in Great Salt Lake. They include the "fairy shrimps" common in roadside pools in the spring, and the brine shrimps.

Phylloxe'ra, genus of plant lice. There are few species indigenous to Europe, but about twenty species have been described from the U. S. Since abt. 1870 the grape phylloxera, or

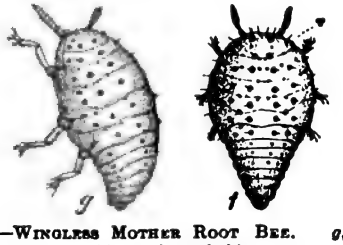


FIG. 1.—WINGLESS MOTHER ROOT BEE. *g*, Dorsal side; *f*, lateral side.

Phylloxera vastatrix, which injuriously affects the grapevine, has attracted so much attention that it is known as *the* phylloxera. The species presents itself in two types—the one (*gallicola*) gall inhabiting, the other (*radicicola*) root inhabiting. A native of N. America, it is found from Canada to the Gulf wherever the grapevine grows. The gall-making type was observed long ago on the leaves of certain varieties, especially the Clinton. The more normal root-inhabiting type was not suspected till 1871. The insect was imported into France, 1863, on vines sent to nurserymen, and soon became a scourge. It now occurs in all vine-raising countries. Having discovered that the cultivated American vines possess a varying degree of resistance to the disease, there has been a demand for cuttings of the least susceptible of American vines. Many vineyards in France have been replanted with American vines.

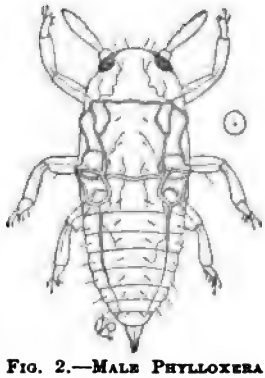


FIG. 2.—MALE PHYLLOXERA Dot in circle showing natural size.

A vine attacked by phylloxera has the more fibrous roots covered with little swellings; and a careful examination of the swellings during the growing season will disclose numerous yellowish lice and yellow eggs barely visible to the naked eye. The swellings rot, and the lice settle on the larger roots. Susceptible vines generally show external signs the second year of attack in a sickly, yellowish appearance of the foliage and in stunted growth; while the third year they frequently perish, when on examination the lice are no longer to be found—they have left or died—and all the finer roots have decayed and wasted away. The wingless phylloxera travels over the surface of the ground from vine to vine, or beneath the ground where the roots interlock; while in the winged form it may fly or be carried as many as 15 or 20 m., and, under exceptional conditions, even more.

Phylog'eny, term introduced by Haeckel to include the evolution of the race. Ontogeny, the contrasted term, includes the development of the individual from the germ. See ONTOGENY.

Physalis (fīs'ă-lĭs), genus of annual or perennial herbs of the family *Solanaceæ* or nightshades, embracing about thirty species, seventeen of which are found in the U. S. The *Physalis peruviana*, otherwise known as strawberry tomato, ground cherry, winter cherry, yellow alkekengi or Cape gooseberry, is cultivated in gardens in England, France, and the U. S., and bears an edible fruit inclosed in a balloon-shaped netted angular calyx.

Phys'ical Educa'tion. See CALISTHENICS; GYMNASTICS.

Physical Geog'raphy, geography of nature, or the science of the surface of the earth and its envelopes, includes physiography, or the classification and explanation of the various elements of the surface configuration; oceanography, or the description and study of the aqueous envelope; meteorology, or the description and study of the gaseous envelope; zoögeography, or the natural distribution of animals; and phytogeography, or the natural distribution of plants. See GEOGRAPHY; PHYSIOGRAPHY.

Phys'ick, Philip Syng, 1768–1837; "father of American surgery"; b. Philadelphia; appointed Prof. of Surgery in Univ. of Pennsyl-

vania, 1805, and, 1819, of Anatomy; 1824 elected president of the Philadelphia Medical Society. He wrote for medical journals accounts of cases he had treated, or of processes or instruments he had invented.

Phys'ics, literally, the knowledge of the processes, both mechanical and vital, which occur in nature; lies between pure mathematics —that is, arithmetic, algebra, and geometry— on the one hand and natural history on the other. Chemistry is properly a physical science, but custom has excluded it from the domain of physics. The principal divisions of physics are: (1) Mechanics, which includes Kinematics, Dynamics, and Statics, or the subject may be divided according to the nature of the body studied. Thus we have the mechanics of a particle, of a rigid body, of an elastic body, and of a fluid, the last being subdivided into Hydrostatics and Hydrodynamics. (2) The secondary physical sciences, *viz.*, Light and Optics, Acoustics, or Sound; Electricity, Magnetism, and the branches dealing with the action of pressure and heat in changing the volumes and physical states of bodies. See DYNAMICS; ELECTRICITY; HEAT; LIGHT; MECHANICS; NATURAL PHILOSOPHY.

Physiog'nomy, art of interpreting the character of man by facial conformation and expression; first presented as a systematic study by Lavater, 1775; was included in the systematic phrenology of Gall and Spurzheim. While much has been, and is still, claimed for physiognomy inconsistent with the facts of the natural history of man and the laws of physiology, the face may be regarded as an index, by expressions developed voluntarily and involuntarily, of the prominent characteristics of intellect, emotion, and will. By electrical excitation of muscles and groups of muscles of the face, the various expressions of mirth, sorrow, impotency, power, etc., may be produced irrespective of the mental condition—expressions which the subject's character had never developed. A large part of facial expression is acquired by unconscious imitation of that of others. See FACE.

Physiog'raphy, the science which describes, classifies, and explains the forms of the earth's surface. The features of the earth are conveniently grouped according to form. The processes through which they originate are: (1) Diastrophism, or uplift and downthrow; (2) volcanism; (3) erosion and deposition by water; (4) erosion and deposition by wind; (5) erosion and deposition by waves; and (6) erosion and deposition by glaciers.

FEATURES OF THE LAND.—Upon the uneven surface of the earth rests a great body of water, which, being gathered in the hollows, divides the surface into a submerged or oceanic portion, and an emergent portion, the dry land. *Continents* are the greatest of the land areas. Their extent, connections, and peculiarities of outline depend on the amount of water on the earth's surface; or they may be regarded as the summits of the greater prominences of the earth's surface, as the result of subterranean processes.

Islands are in general small continents, and owe their character to the accident of ocean level, but some of them are produced by the local and narrowly limited uplift of the ocean floor; others by the building of subterranean volcanoes whose peaks are finally carried above the surface; others by the elevation or subsidence of broad tracts of the earth's surface, elevation bringing above water the shoals of the ocean bed, subsidence causing the sea to overflow the lower parts of the land, leaving plateaus or mountains as islands; yet another class have an organic origin, being formed by the growth of coral reefs which eventually reach the surface.

Peninsulas, differing from islands only in their narrow connections with mainlands, may be ascribed to all the causes which originate islands. *Isthmuses* are only those parts of peninsulas which distinguish them from islands. *Capes* also in general express the relations of ancient forms to modern ocean level. They are original salients of land masses, certain interior features of the land which depend upon the slope or relief of the surface, such as plateaus, mountains, hills, and ridges; others are convex, or prominent, such as basins, valleys, and gorges; the intermediate are slopes, plains, terraces, and cliffs. See PHYSICAL GEOGRAPHY.

Plateaus are broad uplands of somewhat even surface; they may be limited on all sides by cliffs overlooking adjacent areas, or descending cliffs may limit them on one side and ascending cliffs or slopes on the other. The surface may be continuous, or may be interrupted by stream gorges or by valleys. Many plateaus, including all the greatest, are produced by the uplifting of plains; others are produced by the flooding of an upland with lavas, which, yielding less rapidly to subsequent erosion, not only themselves survive, but protect the rocks beneath them while the surrounding country is worn down. Plateaus of moderate size, and especially those with lava caps, are called "table mountains," and in the W. part of the U. S. the term "mesa" is applied to small plateaus definitely bounded by cliffs.

Mountains differ from plateaus by having narrow or acute summits, and they are always bounded by steep slopes. Many are due to uplift along relatively narrow belts, accompanied with folding and faulting of the rocks. Others are built by the heaping of lava and scoria about volcanic vents. Yet others are residua of plateaus which have suffered stream dissection until the extension of gorges and valleys has obliterated the original even top. *Hills* are prominences smaller than mountains. Some of them are volcanic heaps, and many are produced by the dissection of plateaus and plains; but none are the direct results of uplift. A large number are occasioned by glacial deposition, and a few by æolian deposition. In general hills are round-topped as compared with mountains; but in arid regions the hills containing cores of hard rock are apt to have acute summits, and in the W. U. S. such hills are partly discriminated by the term "butte." *Ridges* are merely long and narrow hills or mountains, but usage has given them a distinctive name. The greatest of ridges are pro-

duced by uplift, and are called mountain ranges.' When a plain is lifted so high as to be dissected by its streams it often happens that the principal streams run parallel to one another, and as their valleys broaden the intervening tracts are reduced to ridges. Ridges of similar origin on mountain flanks are called "spurs." When a plateau consisting of folded strata is deeply dissected, the ridge is the most important of the resulting features. The original folding and faulting of the rocks causes the outcrops of the various beds to occupy long, narrow, parallel belts; and the unequal degradation of these, depending on differences in the qualities of the rocks, produces a system of parallel valleys and ridges.

Basins are tracts limited by divides or water partings. They may be regarded as secondary results of the various causes which produce mountains and other uplands. Their interior shapes depend largely upon the action of streams, which are constantly remodeling the face of the land, excavating here and filling there. It is a general law of stream sculpture that the upper slopes are steeper than the lower, and basins are therefore in general concave in cross profile, as the name implies. A special class of basins, those which do not drain to the ocean, but are completely encircled by water partings, are known as interior or closed basins. Many of them, including the greatest, arise from the unequal uplifting of the land, and in a region of great rainfall the entire water supply of a basin escaping from it at one point constitutes so powerful an agent of transportation that an alluvial dam cannot be formed across it.

Valleys are lowlands between uplands. Many valleys are individual basins, but others are parts of drainage basins, and yet others belong to several basins. The name is commonly applied only to those hollows having at bottom lowlands of some width, but in physical geography the term is sometimes used generically for all hollows of the land surface, including valleys proper and gorges. *Gorges.*—The channel occupied by a stream may be excavated from the rock or earth beneath or inclosed by the building of banks with detritus brought by the stream itself. If the tract is lifted into a mountain or plateau, the stream at once cuts its channel deeper, producing a trench or gorge. They are produced also by stream action in a district the configuration of which has been modified by volcanism or by glaciation. The synonomy of the word *gorge* is extensive, but chiefly local. The *ravine* is of small size; a *glen* in N. America is similar to a ravine, but in Great Britain is a narrow valley; the use of *chasm* is largely poetic, but always implies vertical walls; *clove* is restricted to the Catskill Mountains and neighboring regions; *cañon* is a term widely used in the W. part of the U. S. *Slopes* are the sides of mountains, the sides of valleys, etc. A special terminology applies to the various features of slopes. Surfaces nearly level are *plains*; a class of fragmentary plains are terraces; surfaces nearly vertical are *cliffs*; and certain slopes of intermediate grade have also received names.

Plains.—Tracts of land are rendered approximately level and smooth in various ways. When sediment is deposited beneath a lake or ocean, the agitation of the water tends to prevent it from coming to rest on prominences and thus leads to the filling of hollows, and the ultimate result is an even surface. Many of the great plains have been thus formed beneath the water and afterwards lifted into dry land. Other plains are produced by streams, which work toward this result by two processes: (1) A river flowing at base level pursues a sinuous course and washes away the bank on the outer side of each curve, at the same time building up the bank on the inner side. In this way it enlarges its valley, and it also spreads over the bottom of the valley a sheet of alluvium. The surface of this sheet, being overflowed when the volume of water is greatest, is called the flood plain of the stream.

Terraces are subordinate and nearly level plains interrupting steeper slopes. Usually they are bounded upon one side or both by cliffs. Where a series of them occur on the same slope, they are comparable to a flight of stairs. *Cliffs* are produced directly by uplift when the rock on one side of a fracture rises above the other. The steep faces of some mountains are of this origin. The sides of a gorge are cliffs due to stream cutting, and in stream valleys a cliff or bluff is produced wherever the meandering current encroaches on the valley side. Where waves erode a coast, their direct work is limited to a zone at the water level, and they undercut higher masses of land, causing them to fall away in cliffs.

FEATURES OF THE WATER.—By outline, by size, and by relation to land, bodies of water are distinguished as oceans, seas, lakes, bays, straits, etc. The forms of their bottoms are distinguished as deeps, oceanic plateaus, shoals, etc. *Oceans.*—The earth's aqueous envelope is divided into a number of parts, called oceans. The ocean basins are but complements of the continental prominences, and are referable to the same unknown cause. It is probable that the ocean beds are of heavier material than the continents, and that an adjustment of level is prevented by this difference of density. *Seas* are small oceans, and their basins are referable to the same general cause.

Lakes.—The basins occupied by lakes and ponds have already been discussed as basins of the land. After every storm the water gathers in the bottom of the basin, and a portion of it at least is thence evaporated. The rate of evaporation depends on climate and the extent of the water surface, and the extent of water surface has its maximum determined by the size of the basin at the level of the lowest point of its rim. The basins of all lakes are slowly filled by sediments washed into them from the sides; the channels of lake outlets are gradually deepened by the outflowing streams; thus in two ways physiographic processes tend to abolish lake basins, and but for the persistence or recurrence of the processes which create them, they would cease to diversify the face of the land. *Bays*, the converse of capes, are reëntrants of the land. Some of the larger are called *gulfs*, and some of the least inclosed

bights. Where the submerged hollow of the land was previously a stream valley, the resulting bay is called an *estuary*, and the name *fiord* is applied to submerged valleys originally shaped by glaciers. The extension of spits into shallow water sometimes partitions off a portion of the sea which is known as a *lagoon. Straits* are the converse of isthmuses and have a similar history. When the passage between an island and mainland is extensive, it is sometimes called a *channel*, and the word *sound* has a local but not consistent use in the same sense.

Physiol'ogy, that department of natural science which treats of the laws, processes, and phenomena of living organisms. The prominent features of the physiology of the human being are vital force and nutrition. Vitality is the first condition of animal existence—the condition determining growth and maintenance; nutrition supplies the material of the germinal and incipient stages of organism, the mature growth of the body, and constant renewal and regeneration which counterbalance the waste of tissue metamorphosis.

The blood is the circulating nutritive fluid of the body—one thirteenth of the entire weight, or about 12 lb. It is alkaline, and has a specific gravity of 1.052. It consists of the plasma, or water with albumen, fibrine, and salts in solution, and the solid elements, the red and white blood cells and blood plaques. The blood cells constitute from one third to one half of its volume. The white are the largest, but relatively few—one to three or more hundred of the red. The white have active amœboid movements, and probably migrate from the vessels under certain circumstances to form new cells and tissues or for processes of repair. Red corpuscles carry oxygen from the lungs to the tissues; they convey nutritive matters, and bring about changes in certain of the products of digestion.

The heart is the center of the circulation, propelling the blood into the arteries with a force of 51½ lb.—a force steadily decreasing as the arteries subdivide and approach the capillaries. Capillary circulation is effected chiefly by a remaining element of cardiac force. The veins return the blood to the heart. The veins are more numerous than the arteries—have a much greater capacity; hence, the venous blood circulates with less rapidity than the arterial. Venous return is aided by the compression of the integuments, exercise, and the presence of valves in the veins. In 1553 Servetus discovered the circulation of the blood through the lungs. In 1603 Fabricius demonstrated the valves of the veins; he was Harvey's preceptor at Padua. In 1616 Harvey demonstrated the general circulation of the blood, publishing his researches in 1628. In 1661 Malpighi discovered cells in the blood; in 1673 Leuwenhoeck determined these anatomical elements more definitely; in 1770–75 William Hewson discovered the white blood cells.

Respiration is a double act of inspiration and expiration, expansion and contraction of the lung. Freshly inhaled air parts with oxygen in the lungs, which is taken up by the red corpuscles of the blood, while expired air is loaded with carbonic-acid gas, received from venous blood. Respiration is an involuntary act, largely caused by the nutritive demand of all parts of the body for a constant supply of oxygen. The materials of the blood are supplied by food after preparation by the processes of digestion. Food must be varied in character, and include nitrogenous substances, hydrocarbons, carbohydrates, water, and a proportion of salts. The preliminary steps of digestion are mastication, insalivation, and deglutition. Albuminous substances are digested by the gastric and pancreatic juices, starchy and saccharine substances by the saliva and pancreatic and intestinal juices, and fatty substances by the secretions of the small intestine, pancreas, and liver. Emulsified food is but little absorbed from the stomach, but chiefly by the lacteals of the bowels, and emptied by the thoracic duct into the blood. Secretion is the action of special glands in the body, saliva, gastric and intestinal juices to digest food. Excretion is a glandular separation from the blood of waste products. Certain ductless glands—the spleen, suprarenal capsules, thymus, thyroid, pituitary, and pineal glands are specially concerned in the elaboration of the blood. Nutritive waste and supply and glandular activity evolve heat to maintain the normal temperature of the body—in the healthy adult, 98.5° F., with little variation.

The nervous system is divided into the brain, spinal cord, motor and sensory nerves, and nerves of special sense. Nerve tracts transmit motor stimulus from the brain to the muscles or sensory impressions from the body to the brain. The rapidity of nerve action is about 111 ft. per second. Sensation is received by the tactile bodies of the hands and feet, the sensitive papillæ of the skin, taste buds of the tongue, etc. The brain comprises the cerebrum—the seat of the mind—the basal ganglia, the cerebellum, pons Varolii, and medulla—controlling vital functions. The spinal cord is a column of nerve fibers connecting the brain with their distributions throughout the body. It possesses a vast number of nerve cells, and is the seat of independent reflex action; it also has a partial control of coördinated action of groups of muscles. The cranial nerves proceed from the brain to their destination without entering the cord; they are partly nerves of special sense—sight, hearing, smell, and taste; the facial nerve governs the expression of the face; the pneumogastric nerve has important connections with the action of the heart, respiration, and movements of the larynx, and also influences the digestive processes.

Speech is produced by movements of the larynx, tongue, teeth, and lips, and is representative of ideas; it is an artificial method, the invention of man, and slowly developed and perfected. Sight is the impression received by the brain of light and the images of objects, transmitted through the optical media of the eye to the sensitive retina and optic nerve. Hearing is a transmission of sound waves to the tympanum, and, by the system of ossicles and resonating canals and cavities, to the filaments of the auditory nerve. Generation,

or reproduction of definite species and of individual characteristics, is the result of predetermined law. Conception begins with the fecundation of germinal elements, which develop vitality, motion, and nutritive growths by successive steps to the perfect human being. See ANATOMY.

Phytel'ephas, botanical name of the genus which produces the ivory nut or vegetable ivory, formerly placed in the palm family. The most important species is *Phytelephas macrocarpa*, which furnishes the ivory nuts. The tree is found in the N. parts of S. America, where on the banks of streams and in other damp localities it forms distinct groves, other trees, shrubs, or even herbs being hardly ever mixed with it. The fruit is a collection of six or seven drupes, each containing six to nine seeds; these drupes are aggregated in a mass which weighs about 25 lb., and there are six or eight to each tree; S. Americans call these *cabezas de negro*, or negro heads. In their early state the seeds are filled with a clear, tasteless liquid, which becomes milky and sweet, and gradually acquires greater consistency, until it is nearly as hard as ivory. Many small articles of turnery are made from them.

Phytoph'thires, group of hemipterous insects which contains the leaf fleas, plant lice, and scale insects, characterized by having usually wingless females, wings, when present, with few veins and uniform texture, and the body frequently concealed by a waxy or powdery secretion. All are parasitic on plants, and cause much damage. Exceptions are to be found in the cochineal insect, the lac insect, and the manna insect. Among the most injurious forms is the grape phylloxera.

Piacenza (pē-ä-chĕn'zä), **Duke of.** See LEBRUN, CHARLES FRANÇOIS.

Piacenza (ancient, *Placentia*), chief town of province of Piacenza, Italy; on the Po, near its junction with the Trebbia; 43 m. SE. of Milan. Formerly a fortress of considerable strength, it is still surrounded by ramparts and trenches forming a circuit of 4 m. The cathedral, begun 1122, is Lombardo-Gothic in style. Among other noticeable churches are San Antonio, built 324 (on the spot, it is said, where St. Barnabas first preached to the people), and San Sisto, known as giving its name to Raphael's famous Madonna, now in Dresden. The Palazzo Farnese, called La Cittadella, was a splendid structure, now a barrack. The Palazzo Comunale (1281) presents fine open-pointed arcades. This town, of Gallic origin, served the Romans as a strong point of defense against Hannibal. Under the Goths it was allowed to govern itself, and under the Lombards and Franks it had a feudal lord. In 1545 it was united with Parma to form a duchy for Pierluigi Farnese, son of Paul III. In 1859 it was united to the Kingdom of Italy. The trade of Piacenza is chiefly in the products of the neighboring country—grain, wine, cheese, etc.; the manufactures are silk, cotton, and woolen goods, and pottery. Pop. (1901) 36,064.

Pi'a Ma'ter (Latin, "gentle mother"), innermost of the meninges or membranes covering the brain and spinal cord. It is so named because it serves in nourishing the nerve centers. It is a fine plexus of blood vessels covering the brain and dipping down into its convolutions; is abundantly supplied with nerves and lymphatics. The pia mater is liable to inflammatory diseases which are collectively designated meningitis.

Pian'oforte, musical instrument played by a double row of keys upon a fingerboard, each key being connected with a hammer which strikes a steel string. The principle of the keyboard was applied to a musical instrument, the clavichord, as early as the fourth century, and other instruments of the same class, as the cithara, the harpsichord, and the spinet, were popular down to the eighteenth century. The invention of the pianoforte has been claimed for Germany, Italy, France, and England. The best evidence seems to assign it to Bartolommeo Cristofori, a harpsichord maker at Padua, Italy, about the year 1710. Marius claimed a similar invention in Paris in 1716, and Christoph Gottlieb Schröter in Germany in 1717. It was not until 1760 that the instrument was manufactured in England by German mechanics; and it was first practically introduced into France by Sébastien Erard. The firm of Broadwood & Stodart soon took a leading position as English manufacturers, and improvements were rapidly made. The grand piano seems to have been first made in 1781, the upright in 1795. Few pianos had been exported to the U. S. when, in 1822, Jonas Chickering began their manufacture at Boston, being the pioneer of an important industry. In the grand piano the strings are placed horizontally and parallel to the keys. In the "upright" piano they run perpendicularly. The manufacture of the so-called "square" piano has practically ceased, owing to the more convenient form of the "upright," especially where little space is available. The former objection to the "upright" piano—*viz.*, that it soon got out of tune—has been remedied. The piano is essentially the musical instrument of modern times. It has become a household requisite, and as a consequence its manufacturing industry has become a colossal one, extending over the whole civilized world. Outside its own characteristics and powers as a solo instrument, no other can so well represent the orchestra or successions of complex harmonies perhaps originally written for voices. In fact, it is the musician's indispensable assistant in every way. Its own literature, both singly and in combination with other instruments, is the richest, the great composers from Bach and Scarlatti down to the present day having bequeathed to the piano a wealth of their best thought and inspiration.

The automatic piano player is an instrument (made in various styles) designed for the automatic playing of the piano. The keys of the piano are struck by small hammers contained in the piano player. These hammers are moved by air pressure caused by the action of a bellows operated by the feet of the performer. A

sheet of paper, perforated to reproduce a musical selection, is inserted in the player and drawn over a row of small openings. As the perforations admit air into these openings the various hammers are moved and strike the keys of the piano. There are various devices for regulating the speed at which the sheet moves, as well as the strength and duration of the tone. The playing mechanism is also sometimes built into the piano case itself. See HARPS; SPINET.

Pi'arists, religious order in the Roman Catholic Church, whose members take, in addition to the three common monastic vows, a fourth, to devote themselves to the gratuitous instruction of youth; founded at Rome by St. Joseph Casalanza or Calasanctius (1556–1648), a Spanish priest.

Pias'sava Fi'ber, coarse substance used for making brushes and brooms for street sweeping; is exported from Brazil, and produced chiefly from the palm trees, *Leopoldinia piassaba* and *Attalea funifera.*

Piaster (pĭ-ăs'tẽr), monetary unit of Turkey, equal to 4 cents U. S. gold; issued in gold pieces of 25, 50, 100, 250, and 500 piasters each; issued in Egypt in both gold and silver pieces, 100 piasters of gold making the monetary unit of one pound, equal to $4.94 U. S. gold; silver coins, 1, 2, 5, 10, and 20 piasters each.

Piazzi (pē-ät'sē), **Giuseppe,** 1746–1826; Italian astronomer; b. Ponte; joined the order of the Theatines; after being Prof. of Philosophy at several Italian universities, was appointed, 1780, Prof. of Mathematics at Palermo, where he promoted the establishment of an observatory, opened 1791, in which he compiled his famous "Catalogue of the Stars." On January 1, 1801, he discovered the planet or asteroid Ceres. Piazzi revised the plan of the new observatory at Naples, of which he was for some time director.

Pi-Be'seth, Hebrew name of BUBASTIS (Ezek. xxx, 17), a very ancient city of Egypt; on Tanitic branch of the Nile, midway between Heliopolis and Tanis. Monumental remains have been discovered which date from the fourth, sixth, twelfth, and succeeding dynasties, as well as others, which indicate that it has a continuous history down to Roman times; may have been the royal residence at the time of Joseph; if so, it corresponds well with the biblical narrative in being near the land of Goshen.

Pibroch (pē'brŏk), war notes of the Highland bagpipe. There are numerous compositions of this kind, scarcely distinguishable from one another by the untrained ear. The use of this pipe in Scottish warfare has been traced back no farther than 1594.

Picard (pē-kär'), **Jean,** 1620–82; French astronomer; b. La Flèche; became, 1655, Prof. of Astronomy at Collège de France; introduced several improvements in practical geometry which greatly increased the exactness of scientific observations; originated new methods in astronomical observation; made the first exact measurement of a degree of the meridian (between Amiens and Malvoisine, 1669–71); was chiefly instrumental in establishing the Paris Observatory; and wrote valuable works.

Pic'ardy, ancient province of N. France, bordering on the English Channel, and divided into Upper and Lower Picardy; capital was Amiens; conquered by the Franks in the fifth century; formed part of the kingdoms of Soissons and Neustria; afterwards passed to the counts of Flanders, and was divided among several vassal counts; Charles VII reconquered it from the English; now forms the department of Somme and parts of Pas-de-Calais, Aisne, and Oise.

Piccini (pēt-chē'nē), **Nicolo,** 1728–1800; Italian composer; b. Bari; made, 1754, *début* as a composer with the opera "Le Donne dispettose"; achieved, 1760, an almost unprecedented success by his opera "Cecchina, ossia la buona figliuola"; went, 1776, to Paris and engaged in a musical contest with Gluck, brought about by the directors of the Grand Opera; composed during this period "Roland," "Phaon," "Atys," "Iphigénie en Tauride," etc., in all fifteen operas; but, although most of them were received with great enthusiasm, Gluck was victorious, and, other troubles being added to the defeat, Piccini left Paris for Naples, 1791. In Italy he composed several successful operas, "Griselda," "Il Servo Padrone," etc., but the government suspected him of sympathizing with the French Revolution, and, 1798, he returned to Paris, where Bonaparte made him inspector of music at the National Conservatory.

Piccolomini (pĭk-kō-lō'mē-nē), Italian family, associated with the history of Siena and Amalfi. ÆNEAS SYLVIUS PICCOLOMINI, 1458, became pope as Pius II. ALESSANDRO (1508–78), a prelate of Siena, was among the first to use the Italian language in philosophical writings. FRANCESCO (1520–1604), Prof. of Philosophy at Siena and elsewhere, published "Universa Philosophia de Moribus."

Piccolomini, Ottavio (Prince), 1599–1656; Austrian military officer; of Italian origin; fought in the Thirty Years' War on the imperialist side; won distinction at Lutzen, 1632; aided in overthrowing Wallenstein; fought against the Swedes and in the Netherlands; entered the Spanish service, 1643; was recalled by the emperor, 1648, and made marshal.

Picea (pĭs'ē-ă), genus of coniferous trees including about twelve species, known as spruces, all natives of the cooler portions of the N. hemisphere. Six species are natives of N. America, the best known being *Picea canadensis,* white spruce; *P. mariana,* black spruce; *P. pungens,* Rocky Mountain spruce, and *P. engelmanni,* Engelmann's spruce. The European *P. excelsa* is known as Norway spruce.

Pichegru (pēsh-grü'), **Charles,** 1761–1804; French military officer; b. Arbois; entered the Revolutionary army; commander in chief of the Army of the Rhine, 1793; of the Army of the North, 1794; conquered Holland and or-

ganized the **Batavian Republic**, 1795; resumed command of the Army of the Rhine, but on suspicion of treason was deprived of it, 1796. In 1797 he was president of the Council of Five Hundred, but, his plottings with the *émigrés* and the Royalist party being discovered, he was arrested, 1797, and transported to Cayenne. In 1798 he esaped to England, where he formed a conspiracy with Cadoudal, the Polignacs, and others against Napoleon's life; repaired secretly to Paris, but was captured, imprisoned, and found strangled in his cell.

Picenum (pī-sē'nŭm), ancient division of central Italy; on the Adriatic; occupied by the Picentes or Piceni, a Sabine people, who had conquered it from the Umbrians. Among the towns were Ancona, Firmum (now Fermo), Hadria (Atri), Auximum (Osimo), Asculum (Ascoli), and Interamna (Teramo). It was subdued by the Romans, 268 B.C.

Pichincha (pē-chēn'chă), volcano of Ecuador, 11 m. WNW. of Quito, 15,924 ft. high. Near it was fought, May 22, 1822, the battle which secured the independence of Ecuador.

Pich'urim Beans, or Sas'safras Nuts, seed lobes of *Nectandra puchury* (properly *Ocotea pichurim*), a S. American lauraceous tree. They are used by chocolate makers and others for flavoring. They have a strong taste, resembling nutmeg as well as sassafras.

Pick'ens, Andrew, 1739–1817; American military officer; b. Paxton, Pa.; went to Waxhaw Settlement, S. C., 1752; in Revolutionary War rose to rank of brigadier general, and shared with Marion and Sumter the heroic resistance in S. Carolina to British and Tory forces. In February, 1779, with 400 men, he defeated Col. Boyd, with 700 Tories, at Kettle Creek, and at battle of Cowpens, 1781, commanded the militia, which he rallied and brought a second time into action after they had been broken and compelled to retreat. He served in Congress, 1793–95; frequently commissioned to make treaties with the Indians.

Pick'erel. See PIKE.

Pick'ering, Timothy, 1745–1829; American statesman; b. Salem, Mass.; 1775 was appointed Common Pleas Judge for the Co. of Essex and sole Judge of the Prize Court for Suffolk, Essex, and Middlesex; took command of a regiment in 1776; served as adjutant in battles of Brandywine and Germantown; was a member of Continental Board of War, 1777, and quartermaster general, 1780. After the peace he became a merchant in Philadelphia; removed to Wilkes-Barre, 1786; delegate to convention for acting on the proposed Federal Constitution, 1787, and to convention for revising the constitution of Pennsylvania, 1789. He was Postmaster General, 1791–95; Secretary of War, January to December, 1795; Secretary of State till May, 1800. In 1802 he was appointed Chief Justice of the Court of Common Pleas for Essex Co., Mass., 1802; U. S. Senator, 1803–11, and member of U. S. House of Representatives, 1813–17; was an ardent Federalist.

Pick'ersgill, Frederick Richard, 1820–1900; English figure painter; b. London; became Royal Academician, 1858; keeper of the Royal Academy, 1875–87. His works include "Samson Betrayed," "Death of King Lear," and "The Burial of Harold," which was purchased for the Houses of Parliament.

Pick'ett, George Edward, 1825–75; American military officer; b. Richmond, Va.; graduated at West Point, and assigned to the infantry, 1846; served with distinction in the war with Mexico; on frontier duty, 1848–61; resigned, 1861, and entered the Confederate army; brigadier and major general, 1862. In the Virginia Peninsular campaign, 1862, he led a brigade; continuing thereafter with the Army of Northern Virginia, he was conspicuous for bravery; at Gettysburg his division led the assaulting column which suffered so severely July 3, 1863; commanded in N. Carolina at capture of Plymouth; in campaign of 1864–65 made the final stand at Five Forks, where his division was broken up after a desperate resistance.

Pick'nell, William Lamb, 1853–97; American landscape painter; b. Boston, Mass.; member Society of British Artists; honorable mention, Paris Salon, 1880. His pictures of sunlight effects are remarkably luminous. Works by him are in the Metropolitan Museum, New York; Pennsylvania Academy, Philadelphia; Museum of Fine Arts, Boston, and the collection of the corporation of Liverpool, England.

Pico (pē'kō), one of the Azores Islands, belonging to the central group; area, 254 sq. m.; includes the volcanic mass of Pico Alto, 7,613 ft. high. The island produces an excellent wine. Pop. (1902) 24,425.

Pico del'la Miran'dola, Giovanni, COUNT OF MIRANDOLA and PRINCE OF CONCORDIA, 1463–94; Italian philosopher and mystic; went to Florence, 1484; became intimate with the group of Platonizing thinkers known as the "Academy." Seeking to reconcile the Platonic and the Aristotelian systems of philosophy, and, at the same time, to harmonize religion and philosophy, fell into a vague and mystical method of interpretation. The wide range of his knowledge is illustrated by his offer, 1486, to defend against all comers 900 propositions "on all things that may be known." Influenced by Pico's enemies, Pope Innocent VIII forbade the reading of the propositions, as in part heretical. Pico retired to France, but Alexander VI, 1493, absolved him from all taint of heresy. By the great scholars of the time he was regarded as the wonder of the world.

Picot (pē-kō'), **François Édouard,** 1786–1868; French historical and genre painter; b. Paris; Grand Prix de Rome, 1813; member of the Institute, 1836; first-class medal, Salon, 1819; Legion of Honor, 1852. He was the master of a large number of celebrated painters, including Pils, Cabanel, Bouguereau, and Henner. Among his works are "Meeting of Venus and Æneas," Brussels Museum; "Cephalus and Procris," Amiens Museum; several portraits in the Museum at Versailles, and ceilings in the Louvre.

Pi'cric Ac'id (called also CARBAZOTIC, TRINITROPHENIC, and NITROPHENISIC ACID), product of the action of nitric acid on complex organic substances. Carbolic acid, salicine, silk, indigo, and a variety of resins yield it when treated with fuming nitric acid. It is used in dyeing silk yellow, and, in conjunction with other dyes, green; also in dyeing leather and in the manufacture of melinite, one of the most powerful explosives; and, because of its intensely bitter taste, is said to be sometimes substituted for hops in beer.

Picrotox'in, poisonous bitter principle found in the *Cocculus indicus* of commerce, the berries of the *Anamirta cocculus*. An infusion of the berries has been used against lice, and the alkaloid has been employed to prevent night sweats.

Pictet (pēk-tā'), **Raoul**, 1842– ; Swiss physicist and engineer; b. Geneva; for many years Prof. of Physics in Univ. of that city; best known for his successful attempt to liquefy oxygen and nitrogen, 1877–78. The French physicist Cailletet reported a similar result reached by him independently and by the use of an entirely different method. The priority in this matter was given to Cailletet by the Academy of Science, Paris, because he had previously made a demonstration of his method privately before certain members. These researches led Pictet to the development of the industrial applications of his apparatus for the production of artificial cold.

Picts, ancient people inhabiting the E. coast and lowlands of Scotland; supposed to have been identical with the ancient Caledonians; name picti (painted), probably derived from their custom of painting their bodies. Their incursions proved very troublesome to the Roman portions of Britain. The S. Picts were converted to Christianity early in the fifth century, the N. late in the sixth. They suffered severely for centuries from the invading Scots of Ireland, whose king, Kenneth II, finally subdued them, 843. Singular remains called Picts' houses exist in various parts of Scotland.

Pidj'in- (or **Pi'geon-**) **Eng'lish**, artificial dialect employed in Hongkong and the treaty ports of China by foreigners of all nationalities, who do not speak Chinese, in their dealings with native servants, merchants, coolies, etc. Its base is corrupted English, with a mixture of Chinese, Portuguese, and Malay words, arranged according to Chinese idiom. Owing to the difficulty the Chinese have in pronouncing consonantal terminations, vowel terminations *-o* and *-ee* abound, as *olo* for old, *wifo* for wife, *talkee* for talk, *catchee* for catch, *muchee* for much, etc. *Belong* takes the place of the verb *to be*; *my* = I, me, mine; *plenty* = very; *topside* = above, upstairs; *that side* = there; *this side* = here; *how fashion* = why; *savey* = know; *man-man* = slow, gently, quietly; *chop-chop* = quick; *maskee* = no matter, never mind; *chow-chow* = food, eat, etc. The word pidgin is itself a Chinese corruption of the English word "business."

Pied'mont, territory of N. Italy; bounded S. by the Maritime Alps, W. by the Graian and Cottian, N. by the Pennine Alps, E. by the river Ticino; area, 11,336 sq. m. In the twelfth century it became a possession of the house of Savoy, and now it forms, with slightly altered boundaries, a large division of the Kingdom of Italy, subdivided into the provinces of Turin, Cuneo, Alessandria, and Novara.

Piedmont Plain or **Plateau'**, term applied by geographers to that portion of the N. American continent which lies W. of the coastal plain and E. of the Appalachian Mountains. These portions are quite strongly contrasted. The dividing line between the two, known as the *fall line*, marks the localities where the streams from the W. leave the region of hard rocks adjacent to the Appalachians and enter the newer and more easily eroded terranes forming the coastal plain. In New England the Piedmont Plateau is broad but less clearly defined than in the middle and S. Atlantic states, where it is a broken, hilly country, deeply trenched by the rivers flowing across it. It broadens from New York to the S., and reaches its greatest width in N. Carolina, where it extends some 300 m. E. from the Appalachians.

Pierce, Franklin, 1804–69; fourteenth President of the U. S.; b. Hillsboro, N. H.; admitted to bar, 1827; member Legislature, 1829–33 (two last years Speaker); Congress, 1833–37; U. S. Senate, 1837–42; removed to Concord, 1838; commissioned brigadier general, U. S. army, at outbreak of Mexican War; joined the army under Scott at Puebla; fought at Contreras and Churubusco; president New Hampshire Constitutional Convention, 1850; elected President of U. S. (Democrat) by 254 electoral votes to 42 for Gen. Scott, Whig candidate, 1852. Among important events of his administration (1853–57) were the dispute respecting the boundary between the U. S. and Mexico, resulting in the acquisition of Arizona; amicable settlement of a serious dispute with Great Britain about the fisheries; repeal of the Missouri Compromise, and organization of the territories of Kansas and Nebraska under the Kansas-Nebraska Act; reciprocity treaty with Canada; treaty with Japan; and troubles in Kansas. On January 24, 1856, Pres. Pierce sent a message to Congress in which he represented the formation of a free-state government in Kansas as an act of rebellion, and justified the principles of the Kansas-Nebraska Act.

Pierre (pēr), capital of S. Dakota and of Hughes Co.; on the Missouri River; 158 m. W. of Huron; is principal trading point for the Black Hills section; natural gas is used in large quantities for power and lighting; seat of Pierre Univ. (Presbyterian) and of a U. S. Indian industrial school. Pop. (1910) 3,656.

Pietermaritzburg (pē-tėr-mār'its-bûrkh), capital of Natal; over 2,000 ft. above the sea; on plain watered by a tributary of the Umgeni; 73 m. N. of Durban; connected by rail with the Orange River Colony and the Transvaal; chief buildings, government house and office of colonial secretary; takes its name

FANCY PIGEONS.

from Boer founders, Pieter Retief and Gert Maritz. Pop. (1907) est. at 31,207.

Pi'etists, in Germany, Christians who never formed a sect nor professed distinctive doctrines, but were noted for their preference of practical religion. The movement took place wholly within the Lutheran Church, and may be characterized as an attempt to make even the least important everyday doings expressive of the religious spirit, and eliminate from human life anything—such as dancing, visiting the theater, etc.—which proves hostile to such a modification. The rationalism of the close of the eighteenth and beginning of the nineteenth century operated adversely to pietism, but it has largely revived, especially in Berlin, Silesia, and Würtemberg.

Pie'tra Du'ra, name applied to the better kinds of cameo and mosaic work.

Pigeon (pĭj'ŭn), rasorial bird of the family *Columbidæ*, which includes the subfamilies *Columbinæ* or pigeons proper, *Treroninæ* or tree pigeons, *Gourinæ* or ground pigeons, *Didunculinæ* or tooth-billed pigeons, and *Didinæ*, of which the dodo is the only representative. The common pigeon or dove is derived from the wild rock pigeon or biset; in its wild state it lives in caverns and holes in the rocks of the coast, and never in the woods or upon trees; it swarms about the Orkney Islands and the Hebrides and on the rocky islands of the Mediterranean. The parent birds nourish the young with the curdlike contents of the crop, secreted glands like the milk in mammalia, with this difference, that it is secreted by both sexes. Pigeons do not drink like other birds, but by a long, continuous draught, without raising the head until the thirst is satisfied. There are many varieties of breeds, which have all originated from a few accidental varieties of the common species, isolated and bred by man, and not from hybrid crossings with other species. Darwin drew from them some of his strongest arguments in favor of the origin of species by natural selection. Among the varieties are the fantail, Jacobine, pouter, tumbler, and carrier pigeon. The cushat or ring pigeon (*C. palumbus*) is widely distributed over Europe and N. Asia and Africa, even where the winters are severe. It perches, roosts, and nests on trees, keeping a vigilant watch in the daytime. The wood pigeon (*C. œnas*) is smaller and of more limited distribution, found principally in well-wooded districts, migrating to the S. in winter; its habits resemble those of the ring pigeon; it is about 14 in. long; the general color is bluish gray.

In the genus *carpophaga*, embracing the fruit pigeons, there are about thirty species, found in India, Australia, and the islands of the Indian and Pacific oceans; they live on the branches of the highest trees, feeding on fruits and berries. One of the handsomest is the nutmeg pigeon (*C. œnea*), about 18 in. long, inhabiting India and its archipelago; the general color is a fine pale bluish gray, with golden green back, wings, and tail. The zenaida dove (*Zenaida amabilis*), of the subfamily *Treroniæ*, is about 11 in. long; the prevailing color above is reddish olive tinged with gray, with a purplish hue on the head and under parts. The keys skirted with mangroves, in the W. Indies, Florida, and the Galâpagos Islands, used to be their favorite breeding places, hence called pigeon or dove keys; the flesh is excellent. The carrier pigeon is the best known by name of all domestic breeds, but it is *not* the bird used for carrying messages. The bird used for carrying messages and for long-distance flying is the homer, which is not bred for "points" and is not essentially different from an ordinary dovecot pigeon in appearance. By careful selection the pigeon's natural fondness for its own loft has been intensified, while by selection and training birds have been raised which will return home from distances of from 200 to 500 m., and, very rarely, from 1,000 m. The fantail belongs to the short-billed tumbler group, and is characterized by the great number of tail feathers, which should be at least twenty-four, and may be as many as forty, and by having the tail carried more or less erect and open. See CARRIER PIGEON.

Pigeon Eng'lish. See PIDJIN ENGLISH.

Pigeon Hawk, small bird of prey of the falcon subfamily and genus *Hypotriorchis*. The American pigeon hawk, *H. columbarius*, is 12 to 14 in. long and 26 in. in alar extent; the male is smaller than this. The adult bird has been described by Audubon as the little corporal hawk (*Falco temerarius*); its general

PIGEON HAWK.

color is bluish slate. It is found over all temperate N. America, Central America, and the N. part of S. America; it breeds in the N. It is the boldest hawk of its size, pouncing on thrushes, wild pigeons, woodpeckers, snipe, and even teals, but preying chiefly on birds of the size of the red-winged blackbird and sora rail. It has been known to attack cage birds in the porches of houses in large cities.

Pigeon Pea, pealike pulse grown on the leguminous shrubs *Cajanus flavus* and *bicolor*, ex-

tensively cultivated in tropical countries, where they are highly valued. The better sorts are palatable substitutes for the pea.

Pigmenta'tion, in physiology, a discoloration produced by the deposition, to excess, of a pigment in the tissues. The great source of pigment is found in the coloring matter of the red blood corpuscles. Under normal circumstances the greatest amount of pigmentation is found in the appendages of the skin, especially in the hair. The varying color of this is due to the different amounts and possibly different physical relations to the tissue of the same pigment. The same is true of the eyes, which owe their color to the pigment contained in the iris. A varying amount of pigment is found in the skin. The formation of the pigment does not seem to be a function of the epidermic cells; it is formed by certain cells of the connective tissue, and taken up by the epidermic cells.

Pig'ments, coloring matters mixed with oil and other vehicles to form paints. As a rule mineral pigments are more durable than organic. Red pigments are usually made from pure reds, without mixture, except that white lead is often used as a base of the paint. Green pigments are often mixtures of blue and yellow pigments. See PAINT.

Pig'my. See PYGMY.

Pigmy Ape. See BARBARY APE.

Pig'nut. See HICKORY.

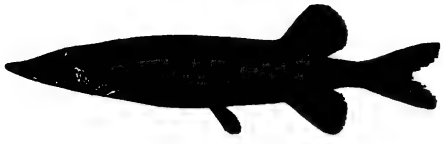
Pigres (pī'grēz), Greek poet of the fifth century B.C., brother of Artemisia, and reputed author of the mock heroic poem, "The Battle of the Frogs and Mice," once attributed to Homer. To him was ascribed also the "Margites," the hero of which was a blundering Jack of all trades and master of none.

Pig'weed. See CHENOPODIUM.

Pika (pī'kä), genus of animals of the family *Leporidæ*, including the tailless hares; largest do not exceed a guinea pig; are found only in alpine or subalpine districts, where they live in burrows or among loose stones, remaining quiet by day and feeding at night; food consists of herbage of different kinds, which they store up in little piles in autumn; when feeding they often utter a chirping or whistling noise. The Rocky Mountain pika (*L. princeps*), or little hare, is about 7 in. long; the general color is grayish above, penciled with black and yellowish white; found along the Rocky Mountains from lat. 42° to 60° N.; frequent heaps of loose stones, coming out after sunset.

Pike, Zebulon Montgomery, 1779–1813; American military officer; b. Lamberton, N. J.; entered the army, 1799; after purchase of Louisiana territory made two expeditions to explore the sources of the Mississippi River, 1805–7, in the course of which he discovered Pike's Peak in the Rocky Mountains; became brigadier general, 1813; commanded expedition sent against York (now Toronto), Canada; killed in assault of town.

Pike, common name of the soft-rayed abdominal fishes of the family *Esocidæ*. The common pike of Europe (*Esox lucius*) rarely exceeds 3 ft. in length or a weight of 12 or 20 lb. Young pikes, or pickerels, are of a greenish hue, and the colors vary much at all ages. The pike inhabits most of the rivers and lakes of Europe, and was long ago introduced into Great Britain, where it is now exceedingly common. Lacepede calls it the shark of fresh



COMMON PIKE.

waters. The common lake pike of the U. S. (*E. estor*) attains a length of 3 ft.; it is found in the Great Lakes. The muskellunge or maskinonge (*E. nobilior*) of Lake Champlain is larger and rarer, and much better for the table, always commanding a higher price than the lake pickerel, though the latter is often erroneously called muskellunge. The common pike of the N. states, the long or shovel-nosed pickerel (*E. reticulatus*), attains a length of 1 to 2 ft. It is everywhere valued for the table, and is caught at all seasons, even through the ice.

Pike, spear with wooden handle and metal head, carried by foot soldiers. In the fifteenth century it was from 15 to 20 ft. long, but was gradually reduced to from 10 to 14 ft. It was designed for use as a thrusting, not as a missile, weapon. Before the introduction of the musket, abt. 1525 A.D., the infantry was armed with the pike. With the introduction of the bayonet in the seventeenth century the use of the pike was gradually given up, although, owing to lack of other arms, it has been used in comparatively recent times, as during the French Revolution.

Pike's Peak, summit of the Rocky Mountains, in El Paso Co., Col.; about 75 m. S. of Denver; 14,147 ft. high; discovered by Capt. Pike; occupied as a U. S. meteorological station, 1842–88, and after 1892; top nearly level; about 40 acres in extent; affords one of the grandest views on the N. American continent, extending nearly 150 m. in all directions; centennial of discovery celebrated at Peak and at Pawnee village (where Pike first unfurled the American flag in Kansas), September, 1906.

PILASTER.

Pilas'ter, square pillar, attached to a wall, from which it projects but little; sometimes has the taper of a column; is sometimes of equal breadth from top to bottom; base and capital usually conform to those of the pillars or columns, though this was not the custom among the Greeks. The name pilaster is also given to a projecting pier of rough

brick or stone standing on the inside of a wall, and designed to sustain the end of a sleeper for the floor above.

Pi'late, Pontius, Roman governor of Judea under whom Christ suffered; was the sixth Roman incumbent of that office, succeeding Valerius Gratus, 25 or 26 A.D., under the reign of Tiberius, and retaining the post ten years. He declined to take notice of the charge of blasphemy against Jesus, and was satisfied that the charge of sedition was unjust; yet to conciliate the Jews, with whom he did not stand well, he reluctantly ordered the crucifixion. Josephus relates several acts of injustice committed by him, and he was finally disgraced in consequence of his cruelty to the Samaritans. According to Eusebius, he was banished to Vienne, Gaul, where he committed suicide abt. 38 A.D. His wife is generally called Procla or Claudia Procula by the Pilate legends, and represented as a proselyte of the gate. Origen, Chrysostom, and Hilary assert that she became a Christian. The Greek Church has made her a saint, and observes October 27th as her day.

Pilcomayo (pĭl-kō-mī'ō), river of S. America; rises in Bolivia, NW. of Potosí; flows SE. through the Gran Chaco, where it separates Argentina from Paraguay, and joins the Paraguay by several mouths below Asuncion; length, over 1,100 m.

Piles (in engineering). See FOUNDATION.

Piles, or Hem'orrhoids, vascular and fibro-vascular tumors of the lower bowel or rectum —termed *external* piles when below the sphincter muscle, *internal* piles when above the sphincter. Piles when chronic are dilated veins of the anus and rectum, with thickening of the tissues investing them; they are caused by anything which obstructs the outflow of blood from the rectal veins, and by any local irritation. They result from excessive eating and drinking, congestion of the liver, alcoholic excesses, and constipation. Sedentary occupation favors their development. The abuse of cathartics, drinking water impregnated with mineral substances, and too fine, nonlaxative diet may develop piles. Piles are to be prevented, and also treated in their milder forms and stages, by regulated, laxative diet, active exercise, and mild saline cathartics. They may be removed by the knife, ligature, or galvano-cautery. When they are strangulated they must be reduced in size by ice or cold water, oiled, and returned. Ulcerated and inflamed piles are treated by cold applications, astringent and anodyne ointments, and free evacuation of watery stools by use of saline cathartics.

Pil'grimage, journey undertaken from devout motives to some holy place. The history of Christian pilgrimages belongs chiefly to the Middle Ages, though from the earliest times the faithful resorted to Palestine. The Mohammedan caliphs treated the pilgrims alternately with cruelty and kindness; but under the Seljuk Turks, who conquered Palestine about 1076, they were subjected to persecution. Soon the miseries of the pilgrims and Christian inhabitants of Jerusalem gave rise to the crusades. The tombs of St. Peter and St. Paul at Rome were reckoned only less sacred than Palestine, and Loreto, on the E. coast of Italy, was famous for the Virgin Mary's house and Assisi for the tomb of St. Francis. In Germany, the Church of St. Peter and St. Paul at Treves was a favorite place of pilgrimage. Cologne, with the supposed tomb of the three kings, and the shrine of St. Ursula and her companions, was next in popularity. In Spain the most famous shrines were those of St. James the Apostle at Compostela and of the Virgin Mary at Monserrat. Among the celebrated shrines in France were Mont St. Michel, in Normandy; St. Martin, at Tours; St. Anne d'Auray, in Brittany; the churches of Ste. Geneviève and St. Denis, in and near Paris, and La Vierge Noire, at Chartres.

In later times Paray-le-Monial, Lourdes, and La Salette have acquired celebrity. England numbered many celebrated shrines of the Virgin Mary, the most ancient of which was Glastonbury and the most renowned Walsingham. In Ireland the principal are the shrine of St. Patrick, at Downpatrick; St. Patrick's Purgatory, an island in Lough Derg, and Croagh Patrick, in Mayo. In America the most noted places of pilgrimage are Guadalupe, near the City of Mexico, and St. Anne, near Quebec. The Russian Orthodox Church has also fostered the zeal for pilgrimages. Besides Jerusalem and the monastery of Mt. Athos, there are famous shrines at Kiev, the *lavra* (high monastery) of the Holy Trinity, 30 m. from Moscow, and St. Alexander Nevski, near St. Petersburg. Among the Mohammedans the pilgrimage most in repute is that to Mecca. The favorite shrines for the Persians are Mesjid Ali, the burial place of the caliph Ali, and Kerbela, where Hussein, son of Ali by Mohammed's daughter Fatima, was slain. The Persians also visit Mecca and Medina. In Hindustan there are innumerable holy places, as Juggernaut, Benares, Hurdwar, Dwarka, Nassick, etc. The Japanese of the Shinto sect make pilgrimages to a temple in the province of Isje. The Sinai of the Japanese Buddhists is the volcano of Fujiyama, near Tokyo.

Pil'grim Fa'thers, name commonly applied to the earliest settlers in Massachusetts. They had separated from the Church of England and sought refuge in Holland, whence they emigrated to Massachusetts, 1620, founding Plymouth Colony. In religion they were Independents, while the Massachusetts Bay colonists were Puritans. See PURITANS.

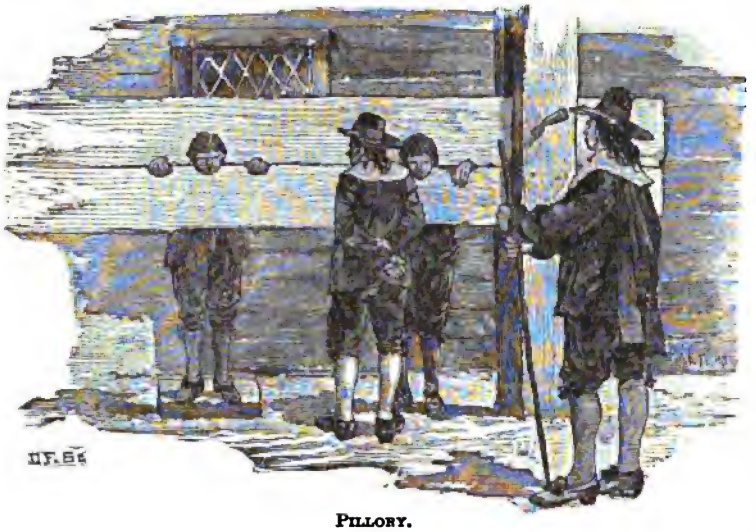
Pil'lar. See COLUMN.

Pillar Saints, or Sty'lites, in the Eastern Church, chiefly in Syria, a class of ascetics who dwelt each on the top of a lofty pillar, after the example of St. Simeon Stylites. The practice began to prevail in the fourth century, and in the twelfth was not yet extinct. It never penetrated into the West.

Pillars of Her'cules. See GIBRALTAR.

Pil'lory, instrument of punishment, consisting of a wooden frame in which the offender's

head and arms were inserted, he standing, thus confined in a stooping posture, exposed to pub-



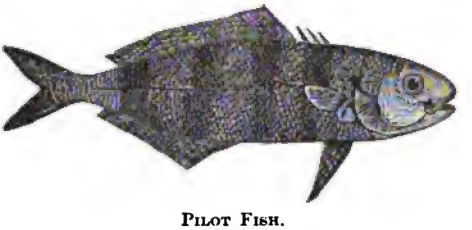
Pillory.

lic ridicule. Something of the kind existed in England previous to the Norman Conquest, and was known as the *halsfang*, or catch neck. From the reign of Henry III, and especially during the sixteenth, seventeenth, and eighteenth centuries, the pillory was a statute punishment for perjurers, forgers, users of false weights, etc. Its use was abolished, 1816, except for perjury and subornation, and was altogether abolished, 1837. In France a similar implement, called the *carcan*, was in use until 1832. The pillory was in use in the American colonies, and provision for its use existed on the statute books of the U. S. until 1839.

Pil'low, Gideon Johnson, 1806–78; American military officer; b. Williamson Co., Tenn.; practiced law at Columbia; appointed brigadier general of Tennessee volunteers, 1846, for the war with Mexico; commanded the right wing at the battle of Cerro Gordo; major general, 1847; took part in the battles of Churubusco, Molino del Rey, and Chapultepec, being severely wounded in the latter, came into collision with General Scott in regard to the convention of Tacubaya, and at his own request was tried on charges of insubordination preferred by Scott, but was honorably acquitted. He resumed the practice of law in Tennessee; raised a force of Tennessee volunteers for the Confederate service, 1861; appointed brigadier general; commanded at battle of Belmont, November 7, 1861; second in command at Fort Donelson in February, 1862; escaped before the surrender, and afterwards served under Gen. Beauregard in the SW.

Pi'lot, word sometimes used to designate an officer of a vessel having charge of its course; but now generally applied to a person not belonging to a ship, who conducts it into or out of a harbor, or wherever the navigation requires superior local knowledge. The office is regulated by law in most civilized countries. In the U. S. an act of Congress authorizes the several states to make their own pilotage laws; and such laws have been enacted by all the seaboard states.

Pilot Fish (*Naucrates ductor*), rarely much more than a foot long, which is found in almost all tropical and temperate seas; so called because it was formerly supposed to act as a pilot to the mariner, and is still supposed to act as such to sharks. These fishes often follow in the wake of vessels, associating with sharks, and taking the refuse thrown from the ships. They are elongated, symmetrical fishes, of graceful form and with



Pilot Fish.

seven cross bands of black, which, however, in part disappear in after life.

Pilot Knob, remarkable hill, nearly 500 ft. high, originally composed almost entirely of magnetic iron ore; in Missouri, about 86 m. SW. of St. Louis; after being worked for several generations, became exhausted and was abandoned for mining purposes, 1907.

Piloty (pē'lō-tē), **Karl von,** 1826–86; German historical painter; b. Munich; painted portraits in Leipzig, 1849, went to Paris and Antwerp, 1852, and thereafter devoted himself to historical subjects; appointed professor in the Munich Academy, 1856; director, 1874. One of his most celebrated works, "Nero on the Ruins of Rome," is in the National Museum, Pest; "The Entry of Godfrey de Bouillon into Jerusalem" is in the Maximilianeum, Munich; the "Triumph of Germanicus," in the New Pinakothek, Munich; the "Death of Alexander the Great," in the National Gallery, Berlin.

Pil'pay, Pilpai, or **Bid'pai,** Oriental fabulist; lived several centuries B.C.; the reputed author of a collection of fables not now extant, but contained partially in the *Panchatantra* and to a less extent in the *Mahâ-bhârata* and the Histopadesa.

Pils (pēlz), **Isidore Alexandre Auguste,** 1815–75; French historical and military painter; b. Paris; awarded Grand Prix de Rome, 1838; first-class medal, Paris Exposition, 1867; medal of honor, Salon, 1861; officer Legion of Honor, 1867; member of the Institute, 1868; Prof. of Painting in the École des Beaux-Arts for a number of years; first attracted attention, 1849, by his picture "Rouget de l'Isle Singing the Marsellaise"; battle pictures made his works very popular.

Pil'sen, town of Bohemia, Austria; at confluence of the Mies and the Beraun; 52 m. SW. of Prague; among buildings are the Gothic Church of St. Bartholomew, 1292, and the Renaissance townhall. There are large breweries, producing the beer known as Pilsener, and manufactures of leather, pottery, machinery, etc. Pilsen was stormed by Count Mansfeld at the beginning of the Thirty Years' War. Pop. (1900) 68,079.

Pim, Bedford Capperton Trevylian, 1826–86; English naval officer; b. Bideford; made a voyage round the world, 1845–51; was engaged in the search for Sir John Franklin; saved the crew of the *Investigator*; was the first who ever succeeded in going overland from the E. to the W. side of the Northwest Passage; published "The Gate of the Pacific" with Berthold Seemann, "Dottings on the Roadside in Panama, Nicaragua, and Mosquito," and "The War Chronicle."

Pimen'to. See ALLSPICE.

Pim'pernel, or **Poor Man's Weath'er Glass,** common herb of Europe (*Anagallis arvensis*), naturalized in N. America, having handsome

PIMPERNEL.

flowers, commonly scarlet, but often white or blue. It always closes on the approach of bad weather. The water pimpernel is *Samolus valerandi*, found in the U. S. and most other countries.

Pin, a bit of wire, generally brass, sharp at one end and headed at the other, used chiefly in the toilet for temporarily securing portions of the dress. The Roman pins were usually of bronze, with variously shaped, ornamented heads; they were from 1 to 8 in. long, and were sometimes made of ivory, bone, or wood. In the Egyptian tombs they are found much more elaborate and costly than the pins of the present time; they are usually of bronze, but some are of silver and gold. In Gloucester, England, the business of pin making was introduced in 1626, and soon gave employment to 1,500 persons. It was established in London in 1636, and afterwards in Birmingham. In the U. S. the manufacture was first undertaken soon after the War of 1812 by some Englishmen in New York. The heads of pins were exclusively made of separate pieces of wire, bent and soldered to the shanks, till 1833, when the first solid-headed pins were sold in London. They were made by the machine patented in England in 1824 by Lemuel W. Wright, of Massachusetts.

In the U. S. the manufacture was firmly established with the invention of a machine patented in 1832 by John I. Howe, of New York, for making the pins with wire or "spun heads," like those imported from Europe, and were no doubt the first self-acting machines. In 1836 they were put in operation by the Howe Manufacturing Company in New York. Their operations were transferred to Birmingham, Conn., in 1838, and soon included the new process of making pins with solid heads patented by Mr. Howe in 1840.

The original process of the manufacture by hand, from the straightening of the wire to the spinning and hammering of the head, was long and tedious, and required no less than fourteen distinctly different operations. At present, all these processes, from the cutting of the wire to the sticking of the pins into papers, are performed by machinery, which needs only to be fed by the proper materials at each stage of its operation. The manufacture of safety pins (in which the point rests in and is covered by a loop) has also reached large proportions both in Birmingham and the U. S.

Pinar del Rio (pē-när' dĕl rē'ō), W. province of Cuba; most famous tobacco-growing region of the world; chief seat of cultivation along the S. slopes of the Cordillera de las Organos, the famous Vuelta Abajo region. This tobacco is usually bought up in advance by speculators, and the manufactured product is retailed at very high prices. The land on which this tobacco grows has been cleared of forests and is covered with siliceous alluvial deposits.

Pinch'beck, kind of brass formerly used for making cheap watch cases, and now used as a substitute for more costly bronze; contains over eighty per cent of copper (the rest is zinc), and has when new a look quite like that of gold.

Pinck'ney, Charles, 1758–1824; American statesman; b. Charleston, S. C.; bred a lawyer; during part of the Revolution was a prisoner of the British; after peace, represented S. Carolina in Congress; member of convention which framed the U. S. Constitution; president of state convention which ratified it and of convention which adopted state constitution, 1790; governor of the state, 1789–92, 1796–98,

1806–8; U. S. Senator, 1798–1801; minister to Spain, 1802–5; again in Congress, 1819–21; an ardent and eloquent Antifederalist.

Pinckney, Charles Cotesworth, 1746–1825; American statesman; b. Charleston, S. C.; became a barrister at Charleston, 1769; colonel of S. Carolina troops in the Revolution; aid to Washington, 1777; displayed great valor and skill in the S. campaigns, 1778–80; prisoner of war, 1780–82; brigadier general, 1783; major general of U. S. troops, 1797; assisted in framing U. S. Constitution; one of the special ministers to France, 1796–97, when he was ordered to leave that country. He was the author of the famous sentiment, "Millions for defense, but not one cent for tribute"; Federalist candidate for Vice President, 1800.

Pinckney, Thomas, 1750–1828; American statesman; b. Charleston, S. C.; brother of preceding; called to the bar in London; served with distinction in the Revolutionary army as aid of Gen. Lincoln; Governor of S. Carolina, 1787–89; U. S. Minister to England, 1792–94, and to Spain, 1794–96, when he negotiated the Treaty of San Ildefonso; was in Congress, 1799–1801; appointed major general, 1812, and served against the Creeks and Seminoles.

Pin'dar, abt. 522–443 B.C.; greatest of Greek lyric poets; b. near Thebes; before the Persian War, 490, had gained a national reputation; though siding with the invaders, he praised the achievements of Athens in the war of liberation, and was rewarded therefor, but fined by Thebes. He traveled far and wide, being employed by princes and states to write odes for great occasions. At the court of Hieron of Syracuse he stayed four years—473–77. He was a priest as well as a prophet, a favored guest of the Delphic god, and the last prophet of the old Doric creed. Of the fragments of his poetry that remain, his "Hymns of Victory," written in honor of victors in the four great national games of Greece, are greatly admired.

Pindar, Peter. See WOLCOT, JOHN.

Pine (Latin, *pinus*), most numerous genus among coniferous trees, distinguished by its foliage of needle-shaped leaves in clusters of two to five, surrounded at the base by a sheath of withered bud scales. The pines, with the exception of one species in the Canaries, are confined to America, Europe, and Asia, and are more abundant in the temperate and cooler portions of these. No trees are so useful in the arts of civilized life as these, as they not only furnish in abundance kinds of wood for which there is no proper substitute, but their other products are of great utility; the abundant juice of some species, which consists of a resin dissolved in a volatile oil, affords turpentine, rosin, tar, pitch, etc. In several species the nuts are edible. *P. strobus*, the common white pine, has its leaves in clusters of five. It extends from about 54° N. to the mountains of Georgia and from Nova Scotia to the Rocky Mountains, and in the N. reaches nearly to the Pacific. It is the tallest tree of the E. states, rising 120 to 150 ft. Of pines with three leaves in a sheath, there are four species; most valuable, the long-leaved or yellow pine (*P. australis*), which for usefulness ranks next to the white pine. It is found S. of N. Carolina; often forms the entire growth on

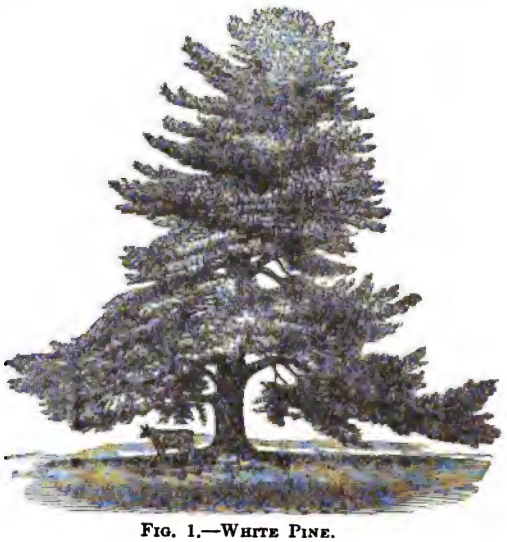


FIG. 1.—WHITE PINE.

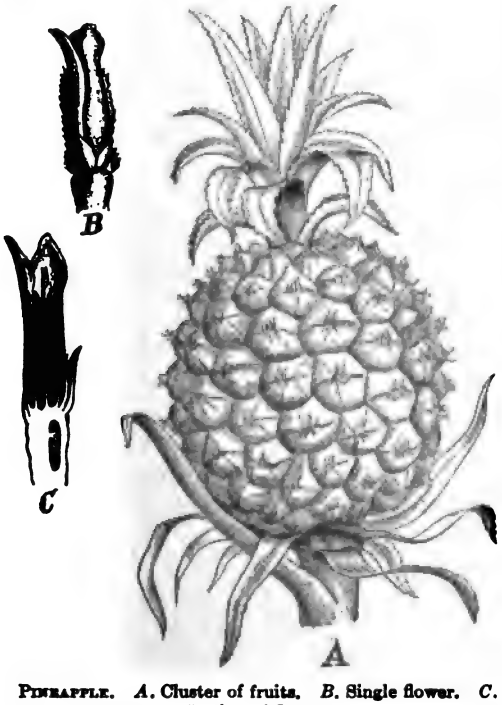
large tracts known as pine barrens; is especially abundant in Georgia and Florida; average height, about 75 ft.; naked trunk shoots up 50 or 60 ft., dividing at the top into a few spreading branches. The wood is strong, compact, durable, and close-grained. The pitch pine (*P. rigida*) ranges from Maine to Georgia, and is much used in shipbuilding, etc.

FIG. 2.—CONE OF NEW MEXICAN NUT PINE.

Among pines having the leaves two in a sheath, only two species are of economical value—the yellow pine and the red pine. The short-leaved yellow pine or spruce pine (*P. mitis*) grows from New Jersey to the Gulf of Mexico, and is usually from 50 to 60 ft. high, with a straight trunk and a handsome, conical head; used for ships' masts, for flooring, etc. The red pine (*P. resinosa*) is found from Can-

ada to Pennsylvania in dry localities; in New England it is incorrectly called Norway pine. The tree in favorable localities reaches 80 ft., with a trunk of uniform diameter.

The pines of the Rocky Mountains and W. to the Pacific are more numerous than in the E. region. The awn-coned pine (*P. aristata*) is of alpine character, being found on the higher peaks of the Rocky Mountains, never below 9,000 ft. altitude, as a straggling bush, or as a tree of 40 or 50 ft., according to situation. The sugar pine (*P. lambertiana*), found from the Mexican border, along the mountains, to the Columbia River, is one of the grand trees of the Pacific region, in groves growing 200 ft. high and 10 ft. in diameter, and isolated specimens reaching 300 ft., with a diameter of 20 ft. The wood is preferred for inside work. Among prominent species with three leaves is the great hooked pine (*P. coulteri*), found in the mountains of California. Sabine's or nut pine (*P. sabiniana*) is found generally in California, and extends into Oregon, the seeds of which are used as food by the Indians. The W. yellow pine (*P. ponderosa*) is the most abundant and most widely distributed of the pines of California and Oregon, and often grows 100 ft. high; the wood is less valuable than that of the sugar pine. The New Mexico nut pine (*P. edulis*) is abundant in parts of New Mexico and Arizona; usual height, abt. 30 ft.; the cones, scarcely 2 in. long, contain large, edible seeds, which the Mexicans call *pinones*. See CONIFERS; FIRS.



PINEAPPLE. *A*. Cluster of fruits. *B*. Single flower. *C*. Section of flower.

Pine'apple (*Ananassa sativa*), tropical fruit, so called from the resemblance in form and external appearance to the cones of some pines. It is a biennial, with leaves which form a crown of foliage, from the center of which rises a stem 2 or 3 ft. high, on the upper portion of which the flowers are crowded in the form of a conical spike. The pineapple in cultivation rarely produces seeds, but in ripening the whole flower cluster becomes enormously enlarged, and when quite ripe fleshy and succulent, being pervaded by a very saccharine, highly flavored juice. The unripe fruit is acrid, and its juice in tropical countries is used as a vermifuge.

Pine Chaf'er, any one of various beetles whose larvæ commit great ravages in pine forests, eating away the new material between the bark and the wood. These insects are *Pissodes strobi*, *Tomicus pini*, *T. xylographus*, and several species of *Hylurgus*.

Pine'finch, or **Gold'finch** (*Spinus pinus*), bird of the family *Fringillidæ*; near relative of the common goldfinch of the U. S. (*S. tristis*); occurs more or less abundantly throughout N. America; attains a length of about 4¾ in.; is brownish-olive above, and beneath whitish, streaked with dusky.

Pine Gros'beak. See GROSBEAK.

Pines, Isle of (Spanish, ISLA DE PINOS), island of the W. Indies; in the Caribbean Sea; 35 m. S. of W. end of Cuba; area, 840 sq. m.; capital, Nueva Gerona; forms municipal district of Havana province; has numerous bays, mountain chain 1,600 ft. high, and marble quarries; chief products, silver, quicksilver, iron, sulphur, rock crystal, tortoise shell, naval stores, pine, mahogany, cedar, and other woods. Discovered, 1494, by Columbus, it was long a resort for pirates. After Spanish-American War many Americans acquired valuable interests there. Disputes arose as to its ownership; Cuba claimed it as an integral part of her territory, the Americans that it was ceded to the U. S. with Porto Rico; the U. S. Supreme Court decided, 1907, in favor of Cuba. Pop. (1899) 3,199.

Pines, Isle of, island in the S. Pacific, belonging to France; 30 m. from the SE. end of New Caledonia; area abt. 58 sq. m. It was discovered, 1774, by Capt. Cook; selected, 1872, for a penal station. Pop. abt. 600.

Pine Snake, serpent (*Pituophis melanoleucus*), 6 ft. long, 2 in. thick, of a shining white color, with dark-brown spots; named from having its home in the pineries of E. N. America, from New Jersey to the S.; also sometimes called the "bull snake," from the loud bellowing sound it produces.

Pingré (păn-grā'), **Alexandre Gui,** 1711–96; French astronomer; b. Paris; published *L'État du ciel*, a valuable nautical calendar, 1754–57; and after verifying La Caille's table of modern eclipses in the "Art de vérifier les dates," computed the similar phenomena that had occurred in the ten centuries preceding his time. He made scientific voyages, 1760–76, and published "Cométographie, ou traité historique des comètes," and other works.

Pinguicula (pĭn-gwĭk'ū-lă). See BUTTERWORT.

Pink, plants of the genus *Dianthus*, all natives of Asia and Europe, for the wild pinks

SWEET WILLIAM.

of the U. S. are of the genus *Silene*, and are properly called campions or catchflies, although *D. armeria*, *D. prolifer*, and one or two others are sparingly naturalized. The most common pinks are beautiful garden and window flowers, often delightfully fragrant. There are thousands of fine varieties —carnation (comprising flake, bizarre, picotee), pheasant's eye, monthly, Chinese pink, maiden, Carthusian pink, Sweet William or bunch pink, clove pink, and mule pink, a hybrid between the Sweet William and carnation, containing several varieties of prized garden flowers. See CARNATION.

CHINESE PINK.

Pink'eye. See INFLUENZA.

Pink'ney, William, 1764–1822; American statesman; b. Annapolis, Md.; son of an English loyalist; admitted to the bar, 1786; member of state convention that ratified U. S. Constitution, 1788; U. S. commissioner in England under the Jay Treaty, 1796–1804; Attorney-general of Maryland, 1805; minister extraordinary, with Monroe, to Great Britain, 1806; minister resident there, 1807–11; U. S. Attorney-general, 1811–14; volunteer officer in War of 1812; in Congress, 1815–16; appointed minister to Russia, and special envoy to Naples, 1816; resigned, 1818; U. S. Senator, 1820–22.

Pink'root, root of a showy herb of the U. S. (*Spigelia marilandica*), found from New Jersey to Wisconsin and Texas; infusion used as an anthelmintic; has also narcotic qualities. Four other species occur in the U. S. *S. anthelmia* is a similar plant of S. America. They belong to the *Loganiaceæ*.

PINKROOT.

Pin'nated Grouse. See PRAIRIE HEN.

Pinnip'edes, suborder of carnivorous mammals containing the seals, sea lions, walruses, and their relatives; so called from the fact that the feet are so modified as to form paddles for swimming, the toes being united by a web or fold of skin.

Pin'ocle. See PENUCHLE.

Pinto (pēn'tō). See SERPA PINTO.

Pinturicchio (pēn-tō-rēk'kē-ō), **Bernardino di Betti,** 1454–1513; Italian painter; b. Perugia; was intimately associated with Perugino in study and work. Among his most famous productions are "The Discovery of the True Cross," in a chapel of the Church of Ara Cœli in Rome, and ten frescoes in the Cathedral of Siena.

Pin'worm (*Oxyuris vermicularis*), parasitic worm sometimes inhabiting the human rectum, especially in young children. This worm is white and filamentous; the male ½ in. long, the female rather less than ½ in. The parasites are troublesome principally by their numbers, and the treatment is to evacuate them by the use of enemata, consisting of soap and water or salt and water, repeated every two or three days until the symptoms are relieved.

Pinzon (pēn-thōn'), **Martin Alonzo,** d. 1493; Spanish navigator; b. Palos; aided Columbus in preparing for his first voyage, 1492; sailed with the expedition, commanding the *Pinta*; parted company with Columbus on the coast of Cuba, November, 1492; was the first to discover Haiti, where he rejoined the admiral, January, 1493. During the return voyage he was again separated by a storm, February 14th, reaching Bayona, a port of Galicia. Thence he sent an account of the discovery to the Spanish sovereigns, who, however, gave all the honor to Columbus.

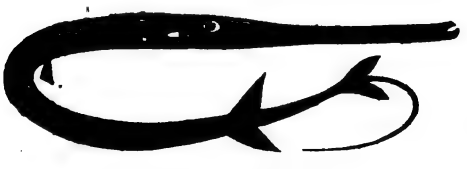
Pinzon, Vicente Yañez, abt. 1460–1524; Spanish navigator; b. Palos; brother of Martin; commanded the *Niña* under Columbus, 1492; made an expedition to S. America, 1500, and discovered the mouth of the Amazon; was associated with Juan Diaz de Solis in an exploration of the Gulf of Honduras, 1506, and of the E. coast of S. America, 1508.

Piombo (pē-ŏm'bō), **Fra Sebastiano del,** 1485–1547; Italian painter, family name LUCIANO; b. Venice. His "Raising of Lazarus," said to include suggestions if not designs by Michelangelo, was intended to rival Raphael's "Transfiguration," "Scourging of Our Lord," in San Pietro in Montorio, Rome, is also a great work. He excelled most in portraiture; Clement VII appointed him keeper of the papal seals, whence his name of Piombo (lead).

Piozzi (pē-ŏt'sē), **Hester Lynch Salusbury,** 1741–1821; English authoress; daughter of John Salusbury, of Bodville, Carnarvonshire, and distinguished for her beauty and accomplishments; married Henry Thrale, 1763, a wealthy brewer of London, who was a member of Parliament. She gathered around her a brilliant circle, including Dr. Johnson, who lived with them for sixteen years. Mr. Thrale died in 1781, and in 1784 she married Piozzi, a Florentine music master. This alliance was keenly resented by her friends, and Johnson entirely gave up her society. Her "Anecdotes of Dr. Johnson" appeared in 1786; "Letters to and from Dr. Johnson," 1788; she also wrote a few poems and an autobiography.

Pipe, bowl and connecting tube of baked clay, stone, wood, or other material, used in smoking tobacco. Clay pipes, with slender stems of 6 in. to a foot or more in length, have been largely supplied to commerce from potteries devoted to this manufacture. The clay is a peculiarly white and adhesive variety. They are largely manufactured in England, Holland, and of a finer quality in France. On the American continent pipes have been in use from very remote periods. They are found in the ancient mounds of the W., elaborately carved in stone into fanciful shapes, often resembling various animals of the country. The finest material now used for pipe bowls is meerschaum; they are also carved from brier and other roots and woods, and in Germany many are made of porcelain. The most elaborate pipes are those of the Asiatics, especially the hookahs of the Persians and Turks.

Pipe'fish, a family of marine lophobranchiate fishes (*Syngnathidæ*). The form is much



SERRATED PIPEFISH.

elongated with little flesh, the body is almost covered with partially ossified plates, the head and snout are long and tubular, and the males have pouches in which the eggs of the female are hatched. They attain a length of 2 or 3 ft., live upon small marine animals and the eggs of other fishes, and have great affection for their young, which often return to the egg pouch of the male parent for protection. Not all the pipefishes belong to this family, that name being often given also to the fishes forming the family *Fistularidæ*, also called pipemouths and flutemouths.

Pipe Line. See PETROLEUM.

Pipera'ceæ, pepper family; dicotyledonous herbs, shrubs, or rarely trees, with naked, usually small, and often imperfect flowers which are commonly spicate; stamens usually two to six; ovary superior, simple, or compound; ovules one or few in each carpel; seeds with small endosperm and large perisperm; embryo very small. There are 1,025 known species, nearly all tropical. Many possess properties which have given them economic value, as *Piper nigrum*, a climbing shrubby species of the E. Indies, whose dried fruits constitute the black pepper of commerce. Other products are cubebs, obtained from *P. cubeba* of the E. Indies, and betel leaves used from *P. betel*.

Pipette', chemical laboratory instrument of glass used for sucking up quantities of liquids by the application of mouth suction; has a long stem with a contracted orifice for introduction into deep or narrow-mouthed vessels, with a bulbous or elongated expanded portion above to contain the liquid. Sometimes pipettes are graduated, so that known quantities of liquids may be taken up.

Pip'it. See TITLARK.

Pip'pi. See GIULIO ROMANO.

Piqua (pĭk'wä), city in Miami Co., Ohio; on the Miami River, 28 m. N. by W. of Dayton. It is the second largest linseed-oil center in the U. S., and contains linseed-oil works, strawboard mills, bent-wood works, rolling mills, tin-plate works, stove foundry, corrugated iron works, woolen mills, hosiery and wagon works, and school-furniture factories. Pop. (1910) 13,388.

Piquet (pē-kĕt'), game of cards in which the ace, king, queen, knave, ten, nine, eight, and seven of each suit are employed, ranking in the order given. After shuffling and dealing, two by two, to each of the two players, until each holds twelve cards, the rest are laid on the table, and constitute a talon of eight cards. Next, the nondealer discards from one to five of his poorest cards and draws as many more from the talon. The opponent next discards. The first player now reckons points, as follows: For *carte blanche* (twelve plain cards), 10 points; for *point* (the hand fullest of any one suit, or, if both hands are alike, the best hand of the two high suits, calling aces 11, face cards each 10, and counting pips on the plain cards) the highest hand scores the number of cards in his fullest suit; for *sequence* (the greatest number of consecutive cards in any suit, or, if both hands are alike in this respect, the one whose highest sequence begins with the

higher card; but no two cards make a sequence) the better hand scores, as follows: If the best sequence is three cards, count 3; for four cards, 4; for five, 15; for six, 16; for seven, 17, etc. Sometimes all sequences are scored. For the *quatorze*, of four equal honor cards, the highest scores 14, or, if there are no sets of four, the highest set of three equal honor cards counts 3, etc. The first player now plays a card. The opponent now scores his *carte blanche* if he has any, adds what other points he has, and then follows suit. Each player counts 1 for each lead; and if the second player takes a trick he counts 1 for that. The one who takes the larger number of tricks counts 10 for *cards*; if he takes all, he counts 40 more for *capot*. If the first hand makes 29 by preliminary scores and 1 by first lead, he counts 30 more by *pique*; but if his first score comes up to 30 before his lead, he scores 60 more by *repique*: 100 or 101 points make the game.

Pi'racy, robbery on the high seas; depredations committed by persons without authority of any state. The essential element of piracy is the intention of preying indiscriminately on the human race, rather than a desire to inflict damage on some particular nationality. As the high seas are not under the jurisdiction of any state, piracy is justiciable in any court. A pirate is a sea rover who preys on the vessels and goods of any nation that he falls in with, or makes descents on the land for a similar purpose of plunder. A privateer exceeding its commission might not be accounted a piratical vessel, but one with a commission from two opposite belligerents would be piratical, since the only motive for such a double commission is plunder of both parties and of vessels bound to the ports of either. The vessel of a part of a state, organized for rebellion and independence, has been held to be piratical, because, although it may have received a commission from the rebel government, it carries a flag unknown to international law, and offers no guaranty of legal belligerent behavior; but the better opinion is that as such a vessel does not scour the sea for the purpose of plunder, and wages war with but one nation, it wants two important characteristics of piracy. As a rule, the search of one vessel by a public ship of another state is a war right only, but search on suspicion of piracy exists in time of peace. The usual penalty for piracy is the confiscation of the piratical ship and hanging of its crew. This shows the wide difference between piracy and privateering, since the penalty for the latter is at most imprisonment. See PRIVATEER.

Piræ'us, town of Greece, on peninsula of same name; 5 m. WSW. of Athens. Of the three ancient ports of Athens, the Piræus alone has always remained in use. The modern town has sprung up since 1834. About 700 vessels enter annually. The railway to Athens was the first constructed in Greece, 1869. Themistocles supplanted Phalerum by the Piræus, and surrounded the peninsula with a line of fortifications. Subsequently it was connected with Athens by the celebrated long walls; but the fortifications and arsenals were destroyed by Sulla. Pop. (1907) 71,505.

Piranesi (pē-rä-nä'sē), **Giovanni Battista,** 1720–78; Italian engraver; b. Venice; most celebrated works relate to the antiquities, public buildings, and views of Rome. His son FRANCESCO, 1748–1810, published in Paris a complete collection of his plates, comprising nearly 2,000 subjects.

Piron (pē-rōñ'), **Alexis,** 1689–1773; French dramatist and poet; b. Dijon; removed to Paris and wrote for minor theaters; produced an excellent comedy, "La Métromanie"; proposed as a member of the Academy, but rejected by Louis XV.

Pisa (pē'zä), capital of province of Pisa, Italy; on the Arno; 12 m. NNE. of Leghorn; is a walled town entered by six gates; has very fine bridges, especially the Ponte del Mezzo, which spans the center of the semicircle formed by the Arno within the town. The duomo (or cathedral), founded probably 1063, on the site of a palace of Hadrian, has a fine dome. The Baptistery, 1154, and the Leaning Tower, 1174, are both circular structures; the latter, 179 ft. high and 50 in diameter, with an inclination of 13 ft. 8 in. (the cornices included), from the perpendicular. The Campo Santo is adorned with frescoes by Benozzo Gozzoli, Orcagna, and others. The university, 1338, has a natural history museum, large library, and about 1,000 students. The town possesses an academy of fine arts and a botanical garden. Pisa is of very remote and uncertain origin. Under the first Roman emperors it rose to great prosperity; after the middle of the fifth century it shared in the common calamities of barbarism invasion. It became an independent republic abt. 1000. After wresting Sardinia, Corsica, and other places from the Saracens, Pisa gave herself to commerce and the arts of peace, but her rapidly increasing power and wealth excited the jealousy of Genoa and of the other neighboring republics. Several Guelphic cities united in a league against this Ghibelline commonwealth. The Pisans finally suffered a great naval defeat at Meloria, 1284. The commonwealth sustained itself, both against France and its own sister republics until 1509, when it was forced to submit to Florence. It was formerly a seaport, but, owing to the accumulation of deposits at the mouth of the Arno, is now about 6 m. from the sea, and its once important commerce has been transferred to Leghorn. There are manufactures of cottons and silks and coral and alabaster ornaments. Pop. (1901) 61,321.

Pisa, Coun'cil of, council called to heal the schism which had distracted the Roman Catholic Church since 1378; summoned by fourteen cardinals (seven in each obedience) of the two rival popes; met in Pisa, 1409; deposed Gregory XII of the Roman line and Benedict XIII of the Avignon line, declaring them both to be schismatics, heretics, perjurers, and vow breakers. Peter Philargi was elected pope and took the name of Alexander V. Proposed reforms were deferred to a general council to meet, 1412. The Church then had three rival popes.

Pisan'der, Greek epic poet who flourished, according to Suidas, about the middle of the seventh century B.C., but probably much later; noteworthy for having first endowed Hercules with the club and the lion's skin, suggestive of sun worship. It has been conjectured that he too fixed the number of labors at twelve, corresponding to the signs of the zodiac.

Pisano (pē-zä'nō), **Andrea.** See ANDREA PISANO.

Pisano, Giovanni. See GIOVANNI DA PISA.

Pisano, Giunta, 1190–1236; Italian painter; b. Pisa; first who attempted to free himself from the Byzantine traditions. One of his earliest works is in the Cathedral of Pisa, a "Crucifixion." Examples of his art exist in Santa Maria degli Angeli at Assisi, as also in the upper church of St. Francis there.

Pisano, Nicola, abt. 1200–78; Italian sculptor; b. Pisa; inaugurated the Renaissance period in Italian statuary. Among his most celebrated works are the marble urn of St. Dominic at Bologna, which he finished only in part, the pulpit in the Baptistery of Pisa, and a still finer one for the Cathedral of Siena. His architectural works comprise the magnificent basilica of St. Anthony (il Santo) at Padua (completed, 1407), and the campanile for the Church of San Nicola at Pisa.

Pisano, Vittore, known also as PISANELLO, 1380–1455; Italian painter and medalist; b. San Vigilio; painted both in tempera and fresco. He worked in Venice, 1421–22, with Gentile da Fabriano. Of his easel pictures only three exist, one of which, "St. Anthony and St. George," is in the National Gallery, London; best known as a medalist.

PISCES.

Pis'ces, twelfth sign of the zodiac, which the sun enters February 20th; formerly corresponded to the constellation of that name. Owing to the precession of the equinoxes, the constellation Pisces is now mostly in the sign Aries; contains no prominent stars.

Piscid'ia Erythri'a, leguminous tree growing in the W. Indies, popularly known as Jamaica dogwood. The wood is largely sold in commerce, and bark has been employed for catching fish, as when placed in the water it stupefies them.

Pisemskii (pē'sĕm-skē), **Aleksei Teofilaktovich,** 1820–81; Russian author of the realistic school; b. Ramene, government of Kostroma; in government service at Kostroma, 1844–53; then removed to St. Petersburg; works include the novels "A Thousand Souls" and "The Stormy Sea," and the dramas "A Bitter Lot," "Veteran and Recruit," and "The Hypochondriac."

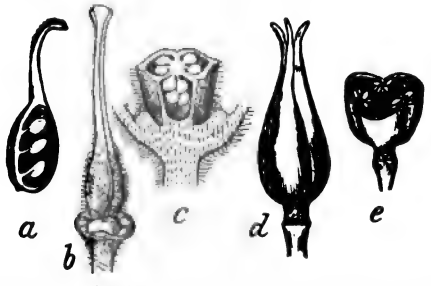
Pis'gah, mountain of Palestine, E. of the Jordan, mentioned several times in the Pentateuch; was the summit from which Moses viewed the Promised Land (Deut. xxxiv, 1). In 1873 it was identified with Siāghah, 2,360 ft. above the sea.

Pisid'ia, ancient territory of Asia Minor, between Phrygia, Isauria, Cilicia, Pamphylia, Lycia, and Caria; was inhabited by wild and predatory tribes, ruled by petty chiefs. The Romans never wholly subdued Pisidia, though they held possession of its chief towns—Antioch, its capital, Salagassus, and Selge. It is now included in the Ottoman vilayet of Konieh.

Pisis'tratus, d. 527 B.C.; Tyrant of Athens; son of Hippocrates and a kinsman of Solon; became an advocate of the lower classes; usurped the chief power, 560; between that date and the year of his death was tyrant seventeen years and an exile sixteen, having been banished twice. He made little change in the laws of Solon; patronized agriculture, the arts, and sciences, and caused the poems of Homer to be collected and edited. His eldest son, HIPPIAS, succeeded him.

Pistachio (pĭs-tä'shō), or **Green Almond** (ä'mŭnd), fruit of the pistachio tree, *Pistacia vera* (family *Anacardiaceæ*), common in the S. of Europe and in Asia and Africa. The nut is delicious for dessert; kernel is somewhat like that of the almond, but green; nut yields a good table oil. To the same genus belongs the mastich, the terebinth, and other valuable trees.

Pis'til, part of a flower which produces ovules; normally occupies the center of the flower; is a leaf structure (phyllome), and in its simplest form consists of a single phyllome (technically a "carpel"), folded upward so that its edges meet. Here the ovules normally

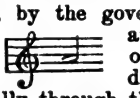


PISTILS. *a*, simple of Isopyrum; *b* and *c*, compound of Staphylea; *d* and *e*, compound of Ascyrum, enlarged.

grow on the infolded edges (placentæ). In many cases two or more pistils (carpels) grow more or less perfectly into a compound structure. Here the ovules still grow on the phyllome edges, but these may be the edges of the same or of different phyllomes, according as each phyllome is fully infolded, or only partially so, its edges joining with those of other phyllomes. In the pistils of many plants the placenta undergoes some displacement; thus the ovules may be on the surface or the midrib of the carpel. In every pistil, whether simple or compound, the enlarged, ovule-bearing part is called the ovary, the more or less slender portion above it is the style, and this is terminated by the stigma. A flower may have many simple pistils, and this appears to have been the condition in primitive flowers; more

commonly, however, the pistils have united into a single compound pistil, as in the great majority of flowering plants.

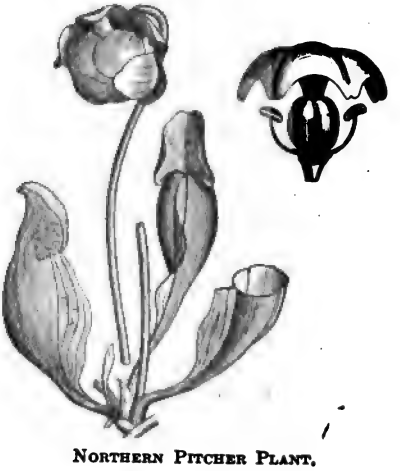
Pitcairn' Is'land, island in the Pacific, lat. 25° 3′ S., lon. 130° 6′ W.; area, 1¼ sq. m.; discovered, 1767; colonized, 1790, by nine mutineers from H. M. S. *Bounty* and eighteen Tahitians. After successive murders, there were left on the island, 1800, one Englishman, who called himself John Adams, together with eight or nine women and several children. From these the present inhabitants, abt. 220, are descended. They came under British control, 1839. See BLIGH, WILLIAM.

Pitch, in music, the degree of acuteness or gravity of a sound, as distinguished from its loudness, harshness, or smoothness, etc. It is improbable that in early times there was any standard corresponding to our *concert pitch*; for though the ancient Greeks had a certain familiarity with the relations and order of intervals, yet the imperfect nature of their instruments seems to forbid the conclusion that the adjustment of such instruments to a strictly accurate pitch was an object of much importance. From the seventeenth century down to the death of Beethoven the pitch was practically the same in various countries. From this date, however, wind instruments began to be much improved, and it was discovered that a slightly higher pitch much enhanced their quality and brilliancy. As the strings were obliged to tune to the wind instruments, a gradual rise of pitch necessarily ensued, affecting voices as well whenever orchestral accompaniment was employed. In France a joint commission of musicians and physicists—appointed, 1858, by the government—fixed the standard A  at 435 double vibrations per second. In the U. S. more or less discrepancy long existed, principally through the desire of pianomakers to retain a high pitch for the sake of brilliancy. It was agreed, however, that the trade should adopt the French standard pitch for all musical instruments made in the U. S., and that the change be made by July 1, 1892. In view of this, the well-chosen title "international pitch" was adopted, as agreeing with that of France, Italy, and Germany.

Pitch. See GUM; TAR.

Pitch'blende. See URANINITE.

Pitch'er Plants, plants which have their leaves, or some considerable portion of the leaf, in the form of a pitcher, urn, trumpet-shaped tube, or other hollow vessel (technically called an *ascidium*) capable of holding water. The principal kinds belong to five different genera of plants in three families, which have no near relationship or resemblance except in the pitchers. All, or nearly all, are insectivorous. One, of a single species, peculiar to SW. Australia, is thought to belong to the saxifrage family, where it stands alone. It is named *Cephalotus follicularis*. The leaves are all in a cluster next the ground; some are flat and of ordinary conformation; others are oval pitchers, hanging from a short stalk near the top on one side. The other pitcher plants belong to two families. One of them, *Nepenthaceæ*, consists of numerous species of one genus, chiefly inhabiting the Indian Archipelago; the other, *Sarraceniaceæ*, is wholly American, mainly N.



NORTHERN PITCHER PLANT.

American, and consists of three genera and several species. This is *Sarracenia*. The pitchers are all at the root, and appear to rise from the ground in a cluster.

Pith, in the stalk and branches of exogenous plants, the central, usually soft, core of cellular tissue; communicates with every leaf bud directly, and with the bark by the "silver-grain" or medullary rays. In most trees and shrubs the older wood encroaches on it, and to some extent obliterates it. In the young shoot it is a reservoir of nutritious juices for the use of the growing parts. Its cavity is lined by the medullary sheath.

Pi'thom, Hebrew name of one of the "store cities" of Egypt, built by the Israelites (Ex. i, 11) for Rameses II at the end of the Wady Tumilat, just W. of the line of the Suez Canal and at the present railway station, Rameses. The site was discovered by Naville, 1883. The civil name of the place was Theku-t (Succoth), the second station mentioned in the Exodus itinerary.

Pitt, William. See CHATHAM, EARL OF.

Pitt, William (generally called the YOUNGER PITT), 1759–1806; British statesman; b. Hayes, Kent; second son of Earl of Chatham; entered Parliament, 1781; allied himself to the opposition party under Shelburne; denounced the war with the American colonies; supported Burke's plan for economical reform, and strove to have the electoral system investigated. On the death of Rockingham, 1781, he was made Chancellor of the Exchequer. In 1783 the Shelburne ministry resigned, and the king pressed Pitt to accept the premiership. He refused, and the coalition ministry of Lord North and Mr. Fox was formed. On the resignation of the ministry, in December, Pitt succeeded as Prime Minister, being appointed First Lord of the Treasury and Chancellor of

the Exchequer. Although Pitt had a good majority in the House of Lords, in the House of Commons he was opposed by Fox, Burke, North, Sheridan, and the great debaters. Despite repeated adverse votes in the Commons, he refused to resign or dissolve Parliament, until, 1784, he had obtained a majority, and then dissolved Parliament. Gaining a majority at the general election of 1784, he established himself firmly in the most powerful position which a subject can occupy in England, and maintained himself in this position without interruption for fourteen years. His administration was marked by parliamentary reforms, abolition of many sinecures, reorganization of the Indian government, and other great measures.

On March 29, 1786, in a speech of six hours, he brought forward a scheme, which was agreed to by the House, for the redemption of the national debt by means of a sinking fund. He remained strictly neutral with regard to the opposing parties in the French Revolution, but in response to the pressure of public opinion declared a war against the French Jacobins, which was weakly conducted and accompanied by many disasters. In March, 1801, on the failure to carry out his plan for uniting England and Ireland and removing the disabilities of the Roman Catholics, he resigned office. In 1804 the new ministry (which had concluded the Peace of Amiens, 1801) was defeated and Pitt was recalled. He formed a ministry, made up, with the exception of Henry Dundas, of inferior talents, the king refusing to allow Fox to be summoned and Fox's friends refusing to serve without him. He was soon beset with the most formidable difficulties. Napoleon was everywhere victorious in spite of the mighty coalitions which the skill of Pitt and the money of England formed against him. Pitt was driven from office, 1805; grew ill with anxiety and grief; finally gave way on hearing of the battle of Austerlitz; and died in a few weeks.

Pit'tacus, 652–569 B.C.; one of the Seven Wise Men of Greece; b. Mytilene, Lesbos; as leader of the democratic party, participated actively in all the feuds and embroilments of his native city, and, 589 B.C., was chosen *æsymnetes* (ruler with absolute power), which office he filled to 579 B.C.

Pitts'burg, or **Pittsburgh** (PITTSBURG, the spelling adopted by the U. S. postal authorities; PITTSBURGH, that of the municipal authorities); capital of Allegheny Co., Pa.; second city in the state in population, manufactures, and wealth; at confluence of the Allegheny and Monongahela rivers, which here form the Ohio; on nine main and several branch lines of railway; 148 m. S. of Erie, 354 m. W. by N. of Philadelphia; is picturesque in its location and surroundings, and spreads for miles over hilltops, the highest of which, Herron Hill, is 535 ft. above the city datum line. The river frontage is several miles in extent. Since 1872 the city has grown rapidly by annexing neighboring boroughs, and, under act of legislature of 1905, declared constitutional, 1906, by consolidation with city of Allegheny. Some twenty bridges cross the rivers, six of these being used by railways. Navigation on the three rivers has been greatly facilitated by the construction of dams, principally on the movable plan. The Davis Island dam, 5 m. below the city, on the Ohio, has a lock 600 ft. long and 110 ft. wide; length of dam and width of lock, 1,333 ft. The dam creates a pool of navigable water 8 m. long, throwing around Pittsburg a fine harbor unaffected by drought or low water in the rivers.

Pittsburg is the center of the greatest natural-gas field in the U. S., and of a great petroleum-producing territory; is surrounded by a bituminous coal field 14,000 sq. m. in extent; produces more than half of all coke made in the U. S., more than half the total steel output, and one fourth of the pig iron. Here are many mills of the U. S. Steel Corporation; the works of the Westinghouse companies, which manufacture air brakes, railway signals, and electric machinery of all kinds; immense flint, lime, and plate-glass factories. Within or on the borders of the city are large mills for the manufacture of railway locomotives, stationary engines, steel bridges, steel tubing, and coal-drilling machinery. Other industries include the manufacture of cotton, woolen and silk goods, leather, flour, artistic brass goods, fire brick, salt, stoves, building brick, chemicals, white lead, paper, corks, beer, and pickles. "Factory-system" manufacturing establishments (1909 census), 1659; capital employed, $283,139,000; average number of wage earners, 67,474; value products, including custom work and repairing, $243,454,000. Imports of domestic and foreign merchandise for year ending June 30, 1911, $1,773,995. The receipts and shipments of lumber, live stock, coal, coke, and petroleum are very large. The public parks include Schenley, 422 acres, and Highland, 366 acres, which connects the E. end with the Highland reservoir.

In April, 1754, Virginia militia began to build a fort at the junction of the Allegheny and Monongahela. They were made prisoners by a force of French and Indians, and the French erected Fort Duquesne on the spot. Gen. Braddock's attempt to capture it led to his defeat, 1755. The fort was abandoned and burned, 1758, but was at once rebuilt by Gen. Forbes, commander of a force of British and Colonial troops, and was named Fort Pitt, in honor of the great English statesman. A long controversy between Virginia and Pennsylvania over the territory on which the city now stands was not settled until 1779. Pittsburg was incorporated as a borough, 1804, and chartered as a city, 1816. Assessed valuation of property, 1911, $755,818,383; bonded debt, 1911, $42,530,860; pop. (1910) 533,905.

Pittsburg Land'ing. See SHILOH.

Pitts'field, capital of Berkshire Co., Mass.; between two branches of the Housatonic River; 53 m. WNW. of Springfield; on plateau nearly 1,200 ft. above the sea. The city has a county courthouse of white marble, Berkshire Athenæum, which contains an art gallery, museum, and free library, Hospital of the House of Mercy, Berkshire County Home of Aged

Women, Bishop Memorial Training School for Nurses; manufactures of cotton and woolen goods, shoes, machinery, paper, electrical supplies, brass castings, and other articles. The Berkshire Agricultural Society, 1810, has large exhibition grounds. Pittsfield was known as Boston Plantation, 1735–61; was then incorporated as a village under its present name; chartered as a city, 1890. Pop. (1910) 32,121.

Pitts'ton, city in Luzerne Co., Pa.; on the Susquehanna, near the mouth of the Lackawanna; 8 m. NE. of Wilkes-Barre; center of the Wyoming anthracite coal field, and great coal-shipping point. Manufacturing is promoted by cheap fuel, superior railway facilities, and natural advantages. The establishments include machine shops, planing mills, breweries, knitting mills, pork-packing houses, stove works, ladies' underwear factory, steam-flour mills, paper mill; terra-cotta works, steel-range works, pressed-brick works, and dye works. Pittston was settled abt. 1770; became a post-office station under the name of Pittston Ferry, 1811; incorporated as a borough, 1853; as a city, 1894. Pop. (1910) 16,267.

Pi'us, name of ten popes, the most important of whom follow: PIUS II (ÆNEAS SYLVIO PICCOLOMINI), 1405–64; b. Siena; secretary to the Council of Basel; friend and counselor of Frederick III; brought about the concordats "of the princes," 1446, and of Aschaffenburg, 1448; made Bishop of Trent; later of Siena; proclaimed cardinal, 1456, by Calixtus III; succeeded the latter as pope, 1457; writings, letters, "History of Frederick III," "Description of Germany," and "Commentaries" on events of his own time. PIUS V (MICHELE GHISLIERI), 1504–72; b. at or near Alessandria; became cardinal, 1557; pope, 1566; published, 1566, the "Roman Catechism," and later on corrected editions of the Breviary and Missal; active against spread of Protestantism; excommunicated Queen Elizabeth; contributed much to the victory of Lepanto, 1571; canonized by Clement XI, 1712. PIUS VI (GIOVANNI ANGELO DE' BRASCHI), 1717–99; b. Cesena; succeeded Clement XIV, 1775; improved the administration of the Papal State; condemned, 1794, eighty-five propositions of the Synod of Pistoja, 1786, as contrary to Catholic faith and discipline; rejected the principles and acts of the Congress of Ems; refused to sanction civil constitution of the French clergy; lost Avignon and the Venaissin to France, 1790, and, 1796–97, the N. part of the Papal State to the new Cisalpine republic. He signed Treaty of Tolentino, 1797, by which the dismemberment of his state was confirmed; was carried off to France, 1798, by Gen. Berthier. He died at Valence, after suffering much cruelty and persecution from Napoleon. PIUS VII (GREGORIO BARNABA CHIARAMONTI), 1742–1823; b. Casena; a relative of Pius VI; became a cardinal and Bishop of Imola, 1785; elected pope at Venice, 1800; signed the concordat of 1801 with Napoleon, by which the French Church was divided anew into ten metropolitan and fifty suffragan sees; the resignation of the actual bishops requested; the presentations of the new ones accorded to Napoleon; the Roman Catholic religion acknowledged as that of the state. This concordat underwent various modifications. Pius visited Paris for the coronation of Napoleon, 1804; refused to declare null the marriage of the emperor's brother Jerome with Miss Patterson; was seized by Napoleon's orders, 1809, and imprisoned at Savona, while his cardinals were summoned to Paris, and the Papal State abolished, 1810. He confirmed unwillingly the decrees of the National Council, 1811; was taken, 1812, from Savona to Fontainebleau, in order to terrify him into submission to the emperor's will; signed a new concordat, 1813, which sacrificed many important rights of the pope; soon regretted his step and recalled it. He was set free by Napoleon after the battle of Leipzig, 1814; returned to Rome; had several provinces of the Papal State restored to him by the Congress of Vienna, 1815; fled to Genoa on the escape of Napoleon from Elba; signed concordats with several European nations; restored the Jesuits, 1814; succeeded by Leo XII. PIUS IX (GIOVANNI MARIA MASTAI-FERRETTI), 1792–1878; b. near Ancona, of a noble family; made cardinal, 1840; succeeded Gregory XVI, 1846; began his pontificate by an amnesty and liberal reforms; fled from Rome on outbreak of revolution, 1848; restored by France, 1850; deprived of the legations, 1860, by Victor Emmanuel; maintained independence against Garibaldi, 1867, but was entirely dispossessed of the temporal power, 1870, by the army of Victor Emmanuel. He refused to accept the "guarantees" of May 15, 1871, as implying an indirect recognition of the "accomplished facts"; confined himself thenceforth to the precincts of the Vatican. He declared the Immaculate Conception of the Blessed Virgin Mary to be a dogma or ancient belief of the Church, December 8, 1854; published the "Syllabus of (eighty) Errors," extracted from previous documents of his pontificate, 1864; convoked the Vatican Council, 1868, in which the papal infallibility was declared by the constitution "Pastor Æternus," July 18, 1870; restored the hierarchy in England, 1850, and Holland, 1853; canonized the Japanese martyrs, 1867; established national colleges at Rome, and encouraged missions; succeeded by Leo XIII. PIUS X (GIUSEPPE SARTO), 1835–1914; pope; b. Riese; parish priest, 1858–75; episcopal chancellor Diocese Treviso, 1875; later vicar of chapter of cathedral of Treviso; Bishop of Mantua, 1884–93; cardinal, 1893; Patriarch of Venice; succeeded Leo XIII, 1903; issued an encyclical, February, 1906, denouncing the law separating Church and State passed by the French Govt.; refused sanction to the associations formed under the separation law.

Pizarro (pē-thär'rō), **Francisco,** abt. 1471–1541; conqueror of Peru; b. Truxillo, Spain; illegitimate son of an officer; served with his father in Italy; ultimately drifted to America; for a time, 1510, had charge of the colony of Darien; in 1528 visited the Peruvian coast; returned to Spain, and was empowered to conquer and settle Peru (at his own expense), and was appointed its governor. He invaded Peru, 1532, seized and imprisoned the Inca

Atáhualpa, and after receiving, as the latter's ransom, some $17,500,000 in gold, killed Atahualpa on a charge of conspiracy. Later, he received the submission of the legitimate Inca, Manco. Pizarro received the title of marquis, and, 1535, founded Lima as his capital. Almagro, one of Pizarro's associates in the conquest who had been made Governor of Chile, seized Cuzco, 1537, claiming that it lay within his dominion. War with Pizarro followed; Almagro was defeated and executed, but some of his followers conspired against Pizarro and murdered him.

Pizarro, Gonzalo, abt. 1506–48; Spanish military officer; b. Truxillo; youngest brother of the preceding by the same father but another mother, and also illegitimate; was wholly uneducated except in the art of war; appointed Governor of Quito, 1540. After the assassination of his brother he rebelled against the viceroy, and, 1546, defeated him in battle. This victory gave him for a while undisputed mastery of Peru, but, 1547, he was defeated by the royal forces, taken prisoner, and beheaded.

Pizarro, Hernando, abt. 1465–1565; Spanish military officer; elder brother of the two preceding; legitimate son of Col. Pizarro, and well educated. He took an important part in the conquest of Peru; carried the royal share of the booty to Spain, 1534; returned with a large fleet; and was appointed Governor of Cuzco; was some time prisoner to Almagro, who, having afterwards fallen into his hands, was put to death by his order. In 1539 he went to Spain; was coldly received, and, though no formal sentence was pronounced against him, was imprisoned for twenty years in the fortress of Medina del Campo, and was discharged when nearly one hundred years old.

Plague (plāg), malignant and fatal contagious fever, also called *bubonic plague*, from the frequency of suppurating lymphatic glands, so-called *buboes*. It is now little known, but formerly endemic in Egypt and the Levant, and spread in devastating epidemics throughout Europe; was termed "the pest," the "black death," and the "great mortality." Its first appearance in Europe was at Constantinople, 544 A.D. Since that time epidemics have occurred at variable intervals; there were forty-five in the seventeenth century. The Great Plague of London, 1665, was supposed to have been brought from Holland. It is estimated that in Europe 25,000,000 have died of plague. The disease prevailed in brief and local epidemics during the eighteenth and first half of the nineteenth centuries—at Copenhagen, 1712; Marseilles, 1720; Moscow, 1771; Malta, 1813; Silesia, 1819; Bulgaria (in the Russian army), 1828–29. Its last appearance in Egypt was 1844. In 1857–58 it occurred among the Arabs of N. Africa, 1857 in Mesopotamia, and, 1871, in Persian Kurdistan. An epidemic in the provinces bordering the Volga, 1878, attracted considerable attention among scientific men. As human epidemics are usually preceded by a plague epidemic among the local rats and mice, the agency of these vermin in spreading the disease has led to organized efforts looking to their extermination. See EPIDEMICS.

Plagues of E'gypt, series of calamities, ten in number, which befell the Egyptians (Ex. vii, 14 ff.); due to the refusal of King Pharaoh to let the Israelites depart from his country. They have been explained on a natural basis somewhat as follows: The red (blood) color of the Nile is alleged to have been witnessed in historic times, and is explained by the presence of infusoria from the swamps whose waters run into the Nile. During high Nile the frogs, the Egyptian symbol of "multitude," sought the higher ground and, dying when the water rapidly fell, were gathered into heaps there to rot. The drying pools engendered gnats and flies, whose part consisted in causing cutaneous irritation and in spreading the contagion of the murrain, which is regarded as anthrax, a disease due to the dead frogs. This disease principally attacks cattle, but may be communicated to men. Its outward manifestation would be in "boils," while inwardly it would prove fatal, particularly when reënforced by the meat diet necessitated by the destruction of vegetable life after the plagues of the hail and locusts. Hail, thunder, and the E. wind, the agents of other plagues, were usual phenomena except as to intensity.

Plaice (plās), flatfish, *Pleuronectes platessa*, weighing from 6 to 12 lb.; feeds on mollusca, crustacea, and young fish, and inhabits sandy banks and muddy grounds in the sea; highly esteemed for food, and common on the European coasts.

Plain, broad expanse of nearly level land, distinguished as marine, lacustrine, fluviatile, lava, ice, and denudation plains. The largest marine plains consist of horizontal strata deposited when the region was the bed of a lake or the floor of the shallow ocean margin. For example, the coastal plain of the E. U. S. is a surface of small relief, formerly part of the continental shelf. The great plains of the U. S. are of a complex history. Their sediments, as indicated by fossils, are in part marine, in part lacustrine. The plain of Hungary may be taken as the type of a lacustrine plain; its basin is inclosed by the Carpathian Mountains on the E., and the Danube has now cut a deep outlet valley through them; but at an earlier time, before the outlet was cut so deep, a lake existed behind the mountains, and the present plain is composed chiefly of sediments brought into the lake from the inclosing slopes. Plains, partly of lacustrine origin, partly of surface stream wash, are well exhibited in the interior basins of Utah and Nevada. The most extensive plains of Utah and Nevada are old lake bottoms, revealed by drying, and not yet covered by the stream wash of a dry climate. Sometimes the disappearance of former lakes leaves a broad central depression covered with a level sheet of salt, such as are known in Tibet, Persia, etc.

Large rivers build broad flood plains in their valleys and delta plains at their mouths. The Mississippi gives an example of a flood plain with delta front, well inclosed between bluffs of the slightly higher marine coastal plain. There must be included also various extensive

areas over which wandering rivers have spread out their detritus. Such are the plain of the "valley" of California, the plain of the "valley" of the Po, the Indo-Gangetic plain of N. India, and the plain of E. China. Extensive outflows of lava have occurred in various parts of the world, flooding the lower lands and thus forming broad plains, as in the basin of the Shoshone River, Idaho.

During the glacial period, ice plains like those of Greenland had great extension in NE. America and NW. Europe. It was during the presence of these creeping ice sheets that many of the smooth plains of unstratified glacial drift (till) were spread out in Ohio and the adjacent states.

When plains have long been above the sea, the widening valleys consume the uplands, ultimately producing a broad lowland of denudation. A great part of the Sahara is well advanced toward this consummation, and the great plains in the W. part of the U. S. have also reached an advanced stage of denudation, as their numerous isolated mesas and outliers testify.

Plain'field, city in Union Co., N. J.; on Green Brook; 24 m. W. of New York City; is a beautiful residential place, with Netherwood Heights on the S. and ranges of the Blue Mountains on the W.; contains a young ladies' seminary, academy for boys, Muhlenberg Hospital, public library and art gallery, and manufactures of carpets, printing presses, oilcloth, hats, clothing, machinery, and tools. Pop. (1910) 20,550.

Plain Song, or Plain Chant, in music, the simple, grave, and unadorned chant in which the services of the Roman Catholic Church have been rendered from a very early age. It consists largely of monotone, and its inflections seldom exceed the range of an octave.

Plains, The, or The Great Plains, one of the great physiographic districts of N. America. Through the entire breadth of the U. S., from Texas to the N. boundary and thence for a distance half as great in the Dominion of Canada, a sloping plateau descends E. from the E. base of the Rocky Mountains. Its breadth is from 300 to 600 m., and the E. descent in that distance ranges from 2,000 to 5,000 ft. Its surface is diversified by a few mountain districts, such as the Black Hills and Sun Dance Hills, by numerous streams which cross it from W. to E. and have excavated valleys to a depth of several hundred feet below the general surface, and by other districts, such as the Bad Lands of Dakota, where the surface has been intricately sculptured by rains and minor streams; but in general the surface is undulatory and monotonous. The characteristic feature of the climate is aridity.

Plain'tiff, in law, one who makes plaint; that is, one who states in a common-law court his cause of action against another. In equity courts, the moving party in a suit is called the complainant or petitioner, and in admiralty and ecclesiastical tribunals the libelant. Sometimes the legal title to the claim sued upon is in one person, while another holds the equitable title thereto. The former is known as the legal plaintiff, while the latter is the equitable plaintiff. Under the common-law procedure a claim which had been assigned was suable only in the name of the assigner, who was called the nominal plaintiff, while the one who brought and enforced the action was the real plaintiff.

Planché (plăn-shā'), **James Robinson,** 1796–1880; English author; b. London; appointed rouge croix pursuivant of arms, 1854, and Somerset herald, 1866; produced more than 200 pieces for the stage, some of them being translated from the French; other works include "Lays and Legends of the Rhine," "Descent of the Danube," "History of British Costume," "A Professional Autobiography," "William with the Ring: a Romance in Rhyme," and "The Conqueror and His Companions."

Plane, in geometry, a surface such that any two points being taken in it, and being joined by a straight line, the whole of such line will be within the surface of the plane. A plane has length and breadth, but no thickness. The line of intersection of two different planes is always a straight line. A plane figure is a plane bounded by lines, and is a rectilinear plane figure if the lines are straight, or curvilinear if the lines are curved.

Plane Tree, common name for species of the *Platanus*; in the U. S. called the buttonwood,

American Plane Tree.

buttonball, and, incorrectly, sycamore. The single genus contains six species, widely distributed in N. temperate regions.

Plan'er Tree, rather small tree (*Planera aquatica*), of the elm family, of swampy lands in the S. parts of the U. S.; has the general appearance of the elms, but is distinct from them in flower and fruit; timber hard, and suitable for many uses. The wood of *P. abelicea*, of the Levant, is aromatic. Another planer tree is *P. richardi*, of Persia and the Caucasus, partly naturalized in Europe, and sometimes called *zelkona*.

Plan'et, originally, any one of those heavenly bodies which seem to change their positions

on the celestial sphere. In the earliest days it was noticed that all the constellations and the thousands of stars which formed them preserved their relative positions from generation to generation without any apparent change, rising and setting as if they were fixed to the interior of a revolving sphere encompassing the whole earth. Seven celestial bodies were found to form an exception; these were the sun, the moon, and five bright stars—Mercury, Venus, Mars, Jupiter, and Saturn. From the changing positions of these bodies they derived their appellation of planets. Among the common characters possessed by the planets are (1) they are globular bodies, rotating on their axes, and therefore slightly ellipsoidal in figure; (2) most of them are probably surrounded by atmospheres, more or less dense; (3) they shine by reflecting the light of the sun. See ASTEROID; COMET; METEOR; STAR.

Plan'etoid. See ASTEROID.

Plant. See BOTANY.

Plantagenet (plăn-tăj'ĕ-nĕt), surname of the Angevine dynasty of English monarchs, derived from the marriage of Matilda, daughter of Henry I, to Geoffrey Plantagenet, Count of Anjou. The Plantagenet monarchs reigned 1154–1485, when the victory of Bosworth transferred the crown to the house of Tudor.

Plan'tain, fruit of the coarser cultivated varieties of *Musa paradisiaca*, the finer and more delicate sorts being called bananas. The plantain is a native of the E. Indies, but is now common in nearly all hot countries. It is

COMMON PLANTAIN.

of the family *Musaceæ*. The plantain furnishes a very large part of the food of the human race in some hot countries. The leaves yield a fiber which closely resembles Manila hemp.

The name plantain is also applied to the species of the weedy genus *Plantago*, inhabitants of all yards and waste places in temperate climates. They are stemless herbs, with a tuft of spreading leaves, and a leafless flower stalk on which are crowded whitish flowers in a small bracted spike or head. The common plantain, *P. major*, is found almost everywhere around dwellings, and is one of the most thoroughly naturalized of all European weeds; it has followed the settler to the most remote parts, and is said to be called "the white man's foot" by the aborigines. The rib grass, *P. lanceolata*, also called ripple grass, buckhorn, and English plantain, is another extensively introduced species, and is abundant in meadows. Most animals, especially sheep, are fond of its mucilaginous leaves, and in England it was formerly cultivated as a fodder plant.

Plant Cut'ter, bird of the genus *Phytotoma*, so called from its habit of cutting off leaves and buds from trees and plants; the few species are peculiar to S. America, and very destructive; resemble sparrows in appearance, but are most nearly related to the tanagers.

PLANT CUTTER.

Plan'tigrades, division of carnivorous mammals, so named because the whole foot, including the tarsus and metatarsus, is applied to the ground in walking. Besides the bears, the plantigrades embrace the glutton or wolverene, badger, raccoon, coaita, kinkajou or potto, and panda or wah.

Plant Louse. See APHIDES; GALL INSECTS.

Plas'ma. See BLOOD; CHALCEDONY.

Plas'sey, a village in Bengal, on the Hooghly, 80 m. N. of Calcutta. Here, on June 23, 1757, Lord Clive, with 900 Europeans and 2,100 Sepoys, defeated Suraja Dowla with an army consisting of 50,000 foot and 18,000 horse, and laid the foundation of the British Empire in India.

Plas'ter, an adhesive mixture of lead oxide and a fatty acid, or a resinous and fatty compound, often medicated, spread on leather, linen, or paper, and then applied to some portion of the human body. Plasters have a considerable use in medicine, and especially in surgery, where strips of adhesive plaster are employed for many purposes.

Plaster of Par'is. See GYPSUM.

Platæ'a, ancient city of Bœotia, Greece; on Mt. Cithæron; famous as the place where, 479 B.C., the Greeks under Pausanias totally rputed the Persians under Mardonius; city was destroyed by the Thebans, 427 and 374 B.C., but was both times rebuilt, and existed in the sixth century A.D. The site was excavated by the American School of Classical Studies at Athens, 1889.

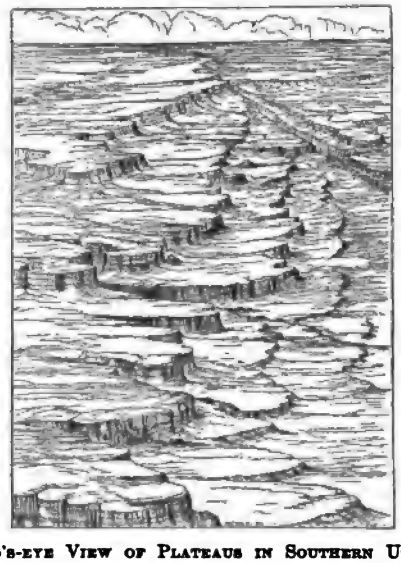
Pla'ta, La. See ARGENTINE REPUBLIC.

Plata, La (city). See LA PLATA.

Plata, Rio de la, inlet in SE. coast of S. America; properly the estuary of the Paraná, but also receiving the Uruguay; separates Uruguay on the N. from the Argentine Republic on the SW.; about 190 m. long and 143 m. wide at the mouth; depth varies from 2½ to 10 fathoms; and strong currents make navigation difficult; best harbor, Montevideo.

Plateau (plă-tō'), **Joseph Antoine Ferdinand,** 1801–83; Belgian physicist; b. Brussels; was an authority in physiological optics and capillarity, but his writings extend over nearly the entire range of experimental physics. He was Prof. of Physics in the Univ. of Ghent from 1835 till his death, in spite of the fact that in middle life he had sacrificed his eyesight to his studies of subjective vision.

Plateau, elevated regions of somewhat even surface. Like plains, most plateaus are built of essentially horizontal strata, either sedimentary beds or lava sheets. The effort to dis-



BIRD'S-EYE VIEW OF PLATEAUS IN SOUTHERN UTAH.

tinguish between plains and plateaus at some definite limit of altitude is not successful, because it introduces an arbitrary division where nature exhibits many gradations. The Great Plains of the U. S. are known as plains, although only their E. border is below the altitude that is usually adopted as separating the two classes of forms. On the other hand, the term plateau is often justly applied to an upland having a moderate altitude above sea level, but rising over a lower plain by a well-marked escarpment, as in the case of the Niagara limestone plateau of W. New York.

Lofty plateaus are seldom so level as lowland plains; for example, the plateaus of Arizona are great blocks of country, 6,000 to 10,000 ft. in altitude, separated from one another by planes or "faults," each block having a slight inclination and a slightly different altitude from that of its neighbor; yet the *llano estacado* or stockaded plain of W. Texas, with an altitude of 3,000 or 4,000 ft., is remarkably smooth over great areas, being compared to the surface of the sea; its margin, however, is eroded into deep valleys and isolated outliers.

Owing to their height, plateaus may attain a great diversity of relief under the action of denuding forces, as in the high plateaus of Utah, whose marginal cliffs or escarpments are gashed by ravines, or the plateaus of Arizona, which are trenched by the cañon of the Colorado River. Like lofty mountains, the uplands of lofty plateaus are cooler and generally better watered than the surrounding lowlands.

Platen-Hallermünde (plä'tĕn-hä'lĕr-mün-dĕ), **August** (Count von), 1796–1835; German poet; b. Ansbach, Bavaria; served for a short time as an officer in the army; lived after 1826 in Italy on a pension granted by the King of Bavaria; author of "The Romantic Œdipus," a satirical poem; "The Fatal Fork," a satirical comedy, etc.; also of a "History of the Kingdom of Naples, 1414–43."

Plathelmin'tha, division of the animal kingdom, embracing wormlike forms with unjointed bodies, in which no cœlom is recognizable, and in which the alimentary canal has but a single opening (mouth). Some live freely, and others as parasites. The free forms occur some on the land, some in fresh water, and some in the sea. Three classes are recognized: Cestoidea (tape and ribbon worms); Trematoda (flukes); Turbellaria (nonparasitic).

Plat'ing. See ELECTRO-PLATING.

Plat'inum, grayish-white metal, distinguished by its great specific gravity and difficult fusibility, discovered in Chow, S. America, and taken to Europe, 1735. It occurs in the native state alloyed with palladium, rhodium, iridium, osmium, and ruthenium, and a little iron, in the form of small flattened grains; sometimes in larger nodules, alloyed with gold and traces of silver, and with copper, iron, and lead. Platinum is found, like gold, chiefly in alluvial deposits, in rounded grains, *pépites* or nuggets, or in flattened scales worn smooth by attrition in the gravel of river beds. It is there associated with gold and the other heavy metals, as iridium and iridosmine. Having nearly the same specific gravity as gold, it cannot be separated from it by washing in the ordinary way, so that quicksilver, which will amalgamate with the gold and leave the platinum untouched, is used to effect the separation. It is found in alluvial districts, in the débris of the earliest volcanic rocks, on the slopes of the

Ural Mountains in Russia, in Brazil, Santo Domingo, Borneo, Ceylon, California, and Australia; also, associated with chromite, near Plattsburg, N. Y.; in the form of an arsenide in the Sudbury region, Ontaria, Canada; in British Columbia; and with osmiridium and other metals of the group at Port Oxford, Oregon. The largest mass ever found weighs 21 lb. troy, and is in the Demidoff cabinet. The alloy of platinum, iridium, and rhodium is harder and withstands a higher heat than pure platinum. The symbol of platinum is Pt; atomic weight, 106.5; specific gravity, 21.5. It resists the highest heat of the forge, but melts in the electric arc and before the oxyhydrogen blowpipe. Its melting point is given as 1779° C. Its crystalline form as found native is that of the octahedron, but all attempts to produce artificial crystals have failed. Platinum possesses the property of causing the union of oxygen with hydrogen and other combustible gases, even in the compact form, but more highly in the spongy state, and still more so as platinum black. The unalterability of platinum at high temperatures, and its power of resisting the action of most chemical agents, render it useful for crucibles and other chemical apparatus. In Russia it was coined into money from 1826 to 1864. The invention of the incandescent electric lamp caused a great demand for platinum wire, and large quantities are consumed yearly for dental purposes, for sulphuric-acid stills, and for various uses by chemists and jewelers.

Platinum Black, finely divided form of platinum, resembling soot; discovered by Liebig; has the property of condensing gases on its surface in a remarkable degree; absorbs many times its bulk of oxygen gas, and gives it off in contact with alcohol or ether, forming new compounds. It is capable of taking up 800 times its own volume of oxygen. Platinum sponge is another form of the metal, porous and slightly coherent, obtained by heating to redness the double chloride of platinum and ammonium. It also condenses gases on its surface, and becomes red hot in a current of hydrogen gas and inflames the gas.

Pla'to (true name, ARISTOCLES), 429–347 B.C.; Greek philosopher; b. Ægina, of aristocratic family; was given his nickname on account of his broad shoulders; early in life served in the army; was a pupil of Socrates during the last eight or nine years of the latter's life. After the death of Socrates, Plato traveled for about twelve years, visiting Egypt, Magna Græcia, Sicily, etc.; then returned to Athens and opened a school in his garden near the academy, where he expounded his doctrines in conversation and formal lectures. Then, in his later years, he visited Syracuse, once in the vain hope of winning the younger Dionysius for his ideal republic. The writings of Plato are all in the form of dialogues; in nearly all Socrates is the chief speaker and the exponent of the author's sentiments. They include "The Republic," "The Laws," "Politicus" ("The Statesman"), "Phædon," "Gorgios," "Phædrus," "Parmenides," "Hippias Minor," "Protagoras," "Apology for Socrates."

Plato held dialectics to be the science of sciences, and physics and ethics to be sciences only so far as they connected themselves with dialectics; and mathematics as simply a help to science; maintained the immortality of the soul, and viewed the soul as consisting of the intellect or reason (the soul proper); a sensuous or appreciative principle, material and perishable; and an intermediate principle which he called passion, mediating between the divine and the earthly. He made the state supreme, regarding it as but the individual on a larger scale, merging in it all the interests of individual and domestic life; believed that it should be governed by philosophers, and that the education and employments of the citizens should be regulated by it.

Plattdeutsch (plät-doitsh'), or **Low Sax'on,** E. branch of Low German. The term "Plattdeutsch" occurs first in the middle of the seventeenth century. Low Saxon is spoken in N. Germany, its area covering about one third of that of the German Empire. It passes beyond the German boundary only toward the W., where it is found in the E. provinces of the Netherlands. Notwithstanding many attempts to secure for the Plattdeutsch a place in literature, High German is at present in N. Germany the language of literature, and also that of the school and the Church, of the government, and of the educated classes. Low Saxon, as a spoken language, is losing ground from day to day. Even where the people still adhere to the Plattdeutsch, which as a rule is the case in the country districts, the genuine dialect is becoming adulterated by words and constructions borrowed from High German. On the other hand, the value of Low Saxon, both in its literary monuments and in its living dialects, as a means for investigating the development of German mental life and the history of the German language, is more and more appreciated.

Platte Riv'er, stream formed in Lincoln Co., Neb., by union of N. and S. forks; former rises in N. Park, Col., receiving the Sweetwater, Laramie, and other streams; latter flows from S. Park, Col.; united stream flows E. and reaches the Missouri at Plattsmouth; chief tributaries, Loup Fork and Elkhorn; length of main stream, 900 m.

Platts'burg, capital of Clinton Co., N. Y.; on the Saranac at its entrance into Cumberland Bay. Lake Champlain, 155 m. N. of Albany, has an excellent harbor, good water power from the lake, large lake commerce and lumber trade; U. S. Govt. building, the finest U. S. army barracks in the U. S., state normal school, woolen, flour, saw and pulp mills, and foundries, sewing-machine factory, and machine shops. Plattsburg is the home of the Roman Catholic Summer School of America. In September, 1814, Commodore McDonough gained a victory over a British fleet in Cumberland Bay, and Gen. Macomb repulsed a superior British force on land. Pop. (1910) 11,138.

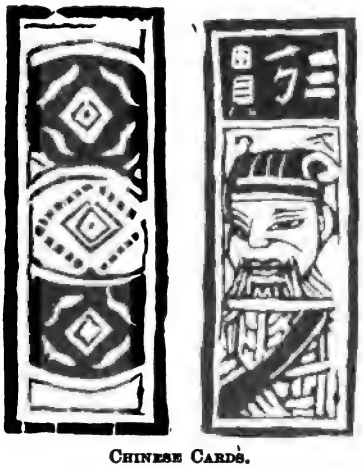
Plauen (plow'ĕn), town of Saxony, Germany; on the Elster; 61 m. SW. of Leipzig; has many good educational institutions, and large manu-

factures of paper, leather, muslin, cambric, jaconet, and other woolen and linen goods. Pop. (1905) 105,380.

Plau'tus, Titus Maccius, abt. 254–184 B.C.; Roman playwriter; b. Sarsina, Umbria; went early to Rome, where he found employment with the actors; worked later at a hand mill, and while thus employed wrote three comedies which were well received; from that time lived as a play writer. He adapted his plots, and generally his characters, from the Greek comedians. Some twenty-one of his plays are extant, including "Amphitruo," "Captivi," "Miles Gloriosus," and "Truculentus."

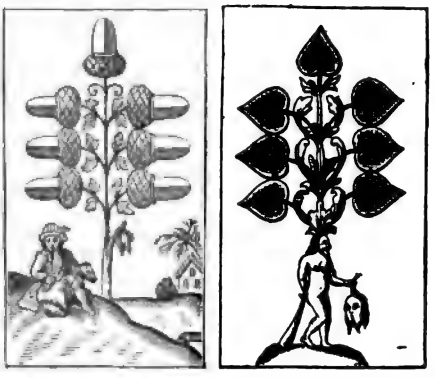
Playa (plä'yä), name adopted from the Spanish (meaning, literally, "shore" or "strand"), for barren mud plains, left by the evaporation of temporary lakes in arid regions. Typical examples occur in many of the desert valleys of the Great Basin, between the Rocky Mountains and Sierra Nevada. The winter is there the rainy season, and water collects in the valleys, forming shallow lakes, or "sinks," which are sometimes 200 or 300 sq. m. in area, but do not overflow. These lakes usually evaporate to dryness during the succeeding summer, but in other instances exist for a series of years, and are desiccated only during seasons of exceptional dryness. These "playa-lakes" are always alkaline, and of a yellowish color, owing to the exceedingly fine silt held in suspension.

Play'ing Cards, kind of cards used for playing games. In modern times, and for the most common games, a pack of cards numbers fifty-two, and consists of four suits, two red (hearts



CHINESE CARDS.

and diamonds) and two black (clubs and spades), each suit comprising thirteen cards —three picture cards, the king, queen, and knave; and ten pip cards numbered from one, the ace, to ten. Chinese packs have only thirty cards—three suits of nine cards each, and three single cards, which rank higher than the others. In India and other countries there are various other kinds of playing cards, and in Europe and America innumerable games require cards made especially for them. The traditional history of European playing cards derived them, like chess, from Asiatic sources; but according to later investigations playing cards originated in Europe itself, probably in the fourteenth century. Prior to their invention, cards with emblematic pictures were used in fortune telling. The first packs for playing purposes varied in the number of picture cards,



OLD GERMAN CARDS—SEVEN OF CLUBS AND SEVEN OF HEARTS.

but pip cards were from the first divided into four suits. The modern hearts, diamonds, clubs, and spades were designated in Italy and Spain by cups, money, clubs, and swords, and in Germany by hearts, bells, acorns, and leaves. The fifty-two card pack has existed substantially as at present since the fifteenth century. Indicators, or small indexes placed at the corners of the cards, were introduced, 1860. The modern production of playing cards is enormous. Their manufacture is a government monopoly in Russia, and in Great Britain and the U. S. forms a subject of special taxation. The first games played were chiefly of chance, but the tendency has generally been toward those that require greater skill.

Plea, in common-law system of pleading, strictly, the first defense or statement of fact interposed by the defendant in an action at law. The term is also used as a name for an action or suit, as in the expression *court of common pleas*; also in the expression *pleas of the crown*, used to designate the criminal cases in England, in which the crown is the nominal prosecutor, although in fact the prosecutor is usually a private person.

Plead'ing, in law, the making of the written allegations of the parties to an action, by which they state their respective claims and defenses and finally arrive at an issue of fact or of law, the decision of which will determine the judicial controversy between them; also (in the pl.) the allegations themselves.

Pleas'onton, Alfred, 1823–97; U. S. military officer; b. in the District of Columbia; graduated at West Point and assigned to the dragoons (then cavalry), 1844; took part in Mexican War; in Civil War served through the Virginia Peninsular Campaign, 1862; brigadier

general of volunteers, July 16, 1862; engaged at Boonsboro, South Mountain, Antietam, and Fredericksburg; at Chancellorsville his action was effective in checking the advance of Stonewall Jackson's corps; promoted major general, 1863; commanded the cavalry at Gettysburg; transferred to Missouri, 1864; drove Gen. Price from the state; received brevets of lieutenant colonel, colonel, brigadier and major general for gallantry in the field; resigned commission in regular army, 1868; became U. S. collector of internal revenue; appointed major, U. S. army and retired, 1888.

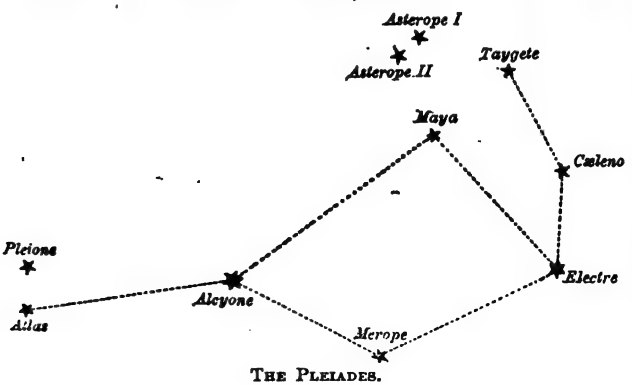
Plebiscite (plĕb'ĭ-sĭt), Latin, *Plebiscitum*, in modern France, a decree of the whole nation obtained by universal suffrage, a proceeding which both Napoleon I and Napoleon III used in order to legitimize their *coups d'état*. In the Roman Republic a *plebiscitum* was a law passed at the *comitia tributa* by the *plebs* or commons on the formal request or rogation of a tribune, and was different from a *lex*, which was passed at the *comitia centuriata* by the *populus* or patricians on the rogation of a consul or other senatorian magistrate. The modern "popular vote" and "universal suffrage," and under the peace treaty after the World War, "self-determination," bear a close relation to the Latin term.

Plebs and Plebe'ians. See PATRICIAN.

Plecop'tera, order of insects which contains the so-called stone flies (*Perlidæ*), and which receives its name from the fact that the broader hinder wing is folded, when at rest, beneath the other.

Pleiade (plā-yăd'), name assumed by a group of seven Greek poets of the third century B.C., and in imitation of them by seven French poets of the sixteenth century, who, inspired by the revival of the study of classical letters, strove to renew French language and literature in their image. They were Pierre Ronsard, Joachim du Bellay, Remi Bellau, Jean Daurat, Pontus de Thyard, Antoine de Baif, and Étienne Jodelle.

Pleiades (plē'yă-dēz), in astronomy, a group of stars in the shoulder of Taurus, called "the seven stars," though to most eyes only six are visible, while keen eyes can see eleven. There are, however, hundreds of telescopic stars in the group, and Herschel has shown that they are, physically, closely related to one another. In Grecian mythology the seven stars were seven daughters of Atlas and Pleïone, one of whom (Sterope) became invisible from shame, because she had been embraced by a mortal.



THE PLEIADES.

Pleistocene (plīs'tō-sēn) **Pe'riod,** latest division of geologic time, or the division succeeding the Neocene period and preceding historic time. The terms Quaternary era, Post-tertiary period, Glacial period, and Ice Age are synonyms. Most of the geologic periods are distinguished one from another by means of their faunas and floras, but the Pleistocene is primarily distinguished by its climatic history. The climate of the earth, or of a large part of it, was then colder than it had previously been for several geologic periods, and colder than it is at present. The most striking feature connected with this lower temperature was the growth of mountain glaciers and the creation of immense ice fields where none had existed before. The evidence of these changes is found not only in certain deposits of peculiar composition, but in equally peculiar types of topographic form. In N. America the small glaciers of the Rocky Mountains and the Sierra Nevada and the greater glaciers of Alaska were all expanded, descending the mountain slopes to greater distances. The glaciers of the Alaska mountains and the W. mountains of British America extended so as to coalesce and fill the intervening valleys, producing an ice field comparable with that of Greenland. At the same time a much larger field was forming in NE. America. It extended E. to the Atlantic, nearly to the NW. field just mentioned, and W. over the Great Lakes into the U. S. New England was completely buried, nearly the whole of New York, and parts of New Jersey and Pennsylvania. The Ohio River was reached near Cincinnati, and the Missouri at many points.

In Europe the glaciers of the Pyrenees, Alps, and Caucasus were greatly extended. Those of Scandinavia spread to the E., S., and SW., making an ice field several times greater than that of Greenland. A large part of Russia, Poland, Denmark, and Holland, and parts of Germany and Belgium were covered, as also were the N. Sea, the whole of Scotland and Ireland, and all but the S. extremity of England.

In the S. hemisphere the changes were equally significant, although less in areal extent by reason of the smaller ratio of land to water. It is believed that the Antarctic ice field was extended. The mountain glaciers of Patagonia were expanded, becoming confluent and overrunning the greater part of the peninsula, so as to produce a field little inferior to that of Greenland. The island of New Zealand was largely overrun by ice, and a few glaciers were created in Australia and S. Africa.

As the temperature fell, animals and plants of the polar and temperate zones gradually worked toward the tropics, and as the temperature again rose they slowly migrated poleward. During the period of rising temperature the plants and animals favored by low temperature were able to adjust themselves to changing conditions not only by migrating poleward, but also by ascending mountain slopes; and thus many mountain tracts in temperate regions came to be inhabited by colonies of plants and animals belonging to distant latitudes and separated from cognate floras and faunas by wide intervals whose present climate is a complete barrier to intercommunication.

Ple'onasm, use of more words than are strictly necessary for the bare expression of an idea; involves the use of words whose idea is already contained in some other part of the statement, generally in some part which is syntactically different.

Plesiosau'rus, genus of large extinct marine reptiles, abundant in Mesozoic time, but had no representatives in the Tertiary. The skull was small, and the teeth were in distinct sockets. The neck was much elongated, and the

PLESIOSAURUS DALICHODEIRUS (restored).

tail comparatively short. The limbs were in the form of paddles, resembling those of the turtles, and were nearly of the same size before and behind. Some members of the group were of enormous size.

Pleth'ora, among older medical authorities, the condition now commonly called full-bloodedness. This excessive richness in the quantity or quality of the blood was thought to be indicated by the redness of the skin and mucous membranes, the full, bounding pulses, the tendency to hemorrhages and palpitations, and other symptoms. Modern investigation, however, has shown that these symptoms are the result of peculiarly vigorous circulation and not of excess of blood.

Pleu'ra, thin membrane that lines the cavities of the chest, extending over the external surface of the lungs. It consists of two closed sacs. The portion lining the chest is distinguished as the costal pleura, and is a sheet of elastic cellular tissue loosely attached to the ribs, muscles, and adjacent parts. That lining the lungs, known as the pulmonary pleura, is composed of a superficial layer of fine cellular tissue and a second elastic layer of coarser fibrous tissue, which materially assists in expiration. Both portions of the pleura are covered inside with a delicate layer of endothelium, and the narrow spaces inclosed in each sac are known as the pleural cavities, and are kept constantly supplied with a serous fluid which enables the opposite layers to glide easily upon each other in the movements of respiration.

Pleu'risy, or **Pleuri'tis,** inflammation of the pleura, acute or chronic. It may be dry, with little or no effusion, or it may be accompanied by effusion. Pleurisy may be caused by exposure to cold, injuries to the membrane itself (traumatism), or the communication of inflammation from adjacent structures. Besides these, a common cause of pleurisy is tuberculosis. Rheumatism is also a cause of pleurisy, and it may occur in the course of fevers, especially in smallpox and scarlet fever. The symptoms of pleurisy are fever, pain in the side, difficulty in breathing, and often a dry, unproductive cough. A patient often finds it easier to lie upon the affected side, because the motion of the side is thereby restricted. The physical signs of dry pleurisy are very slight, consisting chiefly in the sound of rubbing (friction sound) between the two roughened pleural surfaces. In the stage of effusion percussion discloses dullness or flatness over the area occupied by fluid. In pleurisy there is always some impairment of the motion of the side of the chest affected, and evidences of interference with the function of respiration, such as shortness of breath and imperfect aëration of the blood, are often plainly discernible by the eye.

In pleurisy with effusion (hydrothorax) there is poured out more or less excess of the fluid which ordinarily merely lubricates the pleural surfaces. When this effusion is small it may cause no appreciable trouble; when it is extensive, it may press the lung into a very small space, and so seriously interfere with respiration and circulation as to cause death. A pleuritic effusion may become purulent by the multiplication in it of pus cells. This constitutes empyemia. Pleurisy with effusion requires surgical measures to rid the chest of its accumulated fluid.

Pleu'ro-pneumo'nia, one of the names by which ordinary pneumonia (croupous pneumonia) has been designated. It signifies that the pleura is inflamed at the same time as the lung itself. This is always the case in croupous pneumonia; but exceptionally the pleural involvement is of such prominence that the term pleuro-pneumonia seems applicable.

PLEURO-PNEUMONIA (of cattle), or LUNG PLAGUE, a contagious febrile disease of cattle, characterized by a progressive interstitial pneumonia, in which the inflammatory process

usually extends to the pleura. It has been known from the time of the first written records of the diseases of animals. It has often followed in the wake of European armies, having been spread by the cattle carried along for food. The symptoms of lung plague are fever, dry muzzle, accelerated pulse and respiration, depression, cough, and the altered sounds upon auscultation and percussion that indicate pneumonia and pleurisy. In about one half of the cases death occurs in from two to four weeks after the beginning of an attack. It sometimes happens that cattle that have apparently recovered convey the disease to others after several months or years have passed.

Plev'na, town of Bulgaria; on the Vid; 26 m. S. of the Danube. Here the Ottoman army under OSMAN PASHA was besieged by the Russians from July 18 to December 10, 1877, and, after a desperate resistance, was forced to surrender, 43,000 men being taken prisoners. This was the critical event of the Russo-Turkish War. Pop. (1900) 18,709.

Plin'y (CAIUS PLINIUS SECUNDUS, generally called PLINY THE ELDER), 23–79; Roman author; b. Como, of a noble and wealthy family; served in the army in Germany; practiced law in Rome; Served in the Jewish war in Syria, 70, and was later procurator there; procurator in Spain under Vespasian; was suffocated by the eruption of Vesuvius. Of his numerous works, only his "Natural History" is extant.

Pliny (CAIUS PLINIUS CÆCILIUS SECUNDUS, generally called PLINY THE YOUNGER), 61–116; b. Como; nephew of preceding, who adopted and educated him; served in the army in Syria; held high offices (consul, 100); became legate propretor of Bithynia, with consular power; persecuted the Christians there, 112.

Pli'ocene Pe'riod, division of geologic time following the Miocene period and preceding the Pleistocene. In the chronological system adopted by the U. S. Geological Survey for the geologic atlas of the U. S., the Miocene and Pliocene periods of earlier classifications are included in the Neocene period.

Ploti'nus, abt. 205–270; Neoplatonic philosopher; b. Lycopolis, Egypt; went to Alexandria, 232, and spent there ten years under the tutelage and instruction of Ammonius Saccas; 242 accompanied Emperor Gordianus on his expedition against the Persians, in order to make himself acquainted with the philosophy of Persia and India; but the emperor was murdered in Mesopotamia, and Plotinus went to Rome. Here he applied himself to the teaching of philosophy, attracted immense audiences, gained numerous disciples. In 269 he retired into solitude. His works comprise a great number of treatises on beauty, immortality of the soul, supreme good, genesis of ideas, against the Gnostics, etc., arranged in six divisions, each consisting of nine books, for which reason they are called "Enneads."

Ploug (plōg), **Parmo Carl,** 1813–94; Danish poet; b. Kolding; edited the patriotic paper *Fatherland,* 1841–87; many years a member of the Reichstag, and played an important part in the drafting of the constitution, 1848. His first collection of poems, "Paul Rytter's Ballads and Verses," appeared anonymously, and was followed by "Collected Poems," containing a number of patriotic poems, and "Later Songs and Poems."

Plov'er, common name for any member of the family *Charadriidæ,* a group of wading birds of the order *Limicolæ.* Plovers have a bill much like that of a pigeon, long, pointed wings, tail of moderate length, toes slightly webbed, the hindermost lacking or very small. The head is rather large and full, neck short, body plump. There are nearly 100 species distributed over the world. The golden plover (*Charadrius dominicus*) is named from its plumage, which in summer is black above, spotted with golden yellow and white; beneath, as well as the sides of the head, about

GOLDEN PLOVER.

the base of the bill and eyes, black. The bird is remarkable for the extent of its migration, breeding in Arctic N. America and moving S. in winter nearly or quite to Patagonia. The gray plover (*Charadrius* or *Squatarola helvetica*) is another wide-ranging species, for it breeds in the N. parts of America, Asia, and E. Europe, and occurs at other times as far S. as Tasmania. The thick-knees (*Œdicnemus*) are the largest members of the group, measuring about 14 in. in length. The killdeer (*Ægialitis vocifera*) is the type of a small group of pretty plovers distinguished by black breast bands; but the piping plovers, belonging to the same genus, are light gray, their plumage blending in with the sand and pebbles of the sea beaches.

COMMON PLOW.

Plow, or Plough, implement for breaking up the soil; used, though in a primitive form, as

far back in ancient time as history reaches. The Old Testament speaks of plows with shares shod with socks of iron or bronze. The Greeks knew the wheel plow. The modern plow, with its moldboard to turn over the broken-up soil, was invented in the Netherlands in the seventeenth century, but has since been much improved. The first steam plow was worked in England, 1832.

Plow'den, Edmund, 1519–84; English lawyer; b. Plowden, Shropshire; wrote "Commentaries or Reports of Divers Cases in the Reigns of Edward VI, Mary, and Elizabeth," in Norman French, and "Queries, or a Moot Book of Cases, Translated, Methodized, and Enlarged." His works are regarded as the most accurate and authoritative of the old reports.

Plum, wild and cultivated species and varieties of trees of the genus *Prunus*, and their fruit. Of the half dozen native plums only three are generally known. The beach plum, *P. maritima*, is found along the coast from Maine to the Gulf of Mexico, a low, straggling shrub, from 2 ft. to 5 ft. high, with stout branches; grows in clumps in the blowing sands of the shore, and often extends inland

GREEN AGE PLUM.

some 20 m. The fruit, globular and crimson or purple, is ripe in September, and usually pleasant to the taste, but sometimes astringent; is collected for making preserves. The wild yellow or red plum, *P. americana*, also called the Canada plum, grows from Canada to Texas, and in some localities is common; is a showy tree, 8 to 20 ft. high, with a round head. The seeds of this species are used to raise stocks on which to graft the finer cultivated plums. The Chickasaw plum, *P. chicasa*, 6 to 12 ft. high, is probably indigenous only in the SW. states, but has become naturalized in various localities at the E. and N; the fruit is red and of pleasing flavor. Owing to the difficulty of cultivating the varieties of the European plum, on account of the attacks of the curculio, much attention has been given to the improved varieties of the Chickasaw. The European plum has its origin surrounded by the same obscurity that attends other cultivated fruits; is a much-branched, and in its wild state very thorny, shrub, bearing small, globular, black, and astringent fruit. The finer kinds of garden plums are found to vary greatly in the size of foliage, earlier or later blossoming, size and shape of the fruits, and in the smoothness or downiness as well as vigor of their young shoots. A large number of choice sorts have originated in the U. S., and, while many are larger and more showy, none is superior to the greengage, the best of all plums. The damson plum, a variety of the common plum, is a small, oval fruit. In Great Britain it is much used in a confection called *damson cheese*. It is cultivated in the U. S. in several varieties, as Shropshire, Frogmore, and French damsons. The plum is liable to a singular disease, known as the black wart, which, seizing on the young branches, ends by destroying them. The plum weevil is the *Rhynchænus nenuphar*, a small dark-brown beetle, about one fifth of an inch long, best known as the curculio. The female deposits her eggs in young plums, peaches, and other fruit, making a crescent-shaped incision in the skin.

Plumba'go. See GRAPHITE.

Plumes. See FEATHERS.

Plush, fabric which differs from velvet in not being shorn, and in having a long pile or shag; is sometimes all worsted, sometimes worsted with a mohair pile, and most frequently of cotton with a silk pile.

Plutarch (plō'tärk), 46–120 A.D.; Greek biographer and essayist; b. Chæronea, Bœotia; belonged to a wealthy and distinguished family, and lived a long life of study and employment in the service of the empire and of Bœotia. His works fall into two classes, historical and ethical, the latter dealing with philosophical, moral, and miscellaneous subjects and commonly referred to roughly as "Moralia." Of his historical works the most famous is the collection of "Parallel Lives," forty-six lives in twenty-three pairs, a Greek life being set over against a Roman.

Plu'to, name used among the Romans for Hades, though it originated with the Greeks, who called him by that name because, as the god of the lower world, he was lord over all wealth, both vegetable and mineral, that is concealed by the earth from which all wealth springs.

Plu'tus (called also PLUTON), in ancient mythology, the god of wealth; son of Iasion and Ceres; blinded by Jupiter so that he might distribute his gifts without regard to merit, having previously granted them to the good exclusively.

Plym'outh, town of Devonshire, England; on the sound of the same name; at the mouth of the Plym; 128 m. SW. of Bristol; comprises what are called the "three towns"—Plymouth proper on the S., Stonehouse in the middle,

and Devonport, on the W. At the E. end of the bold headland called the Hoe, there is a chain of forts of great strength, which form a complete line of defense by land and sea. Among the principal buildings are the Guildhall; the Proprietary Library in which there is the Cottonian collection of pictures; and the Athenæum, which contains a library, lecture hall, museum, and art gallery. The parish church of St. Andrew dates from 1430. As a great naval station Plymouth owes its preeminence to the spaciousness and extent of Plymouth Sound, within which the whole British navy might anchor with safety. To protect the interior of this estuary the Plymouth breakwater was constructed. The E. harbor, Sutton Pool, is an anchorage for the shipping employed in the fisheries and general trade. The Great W. Docks include a floating basin of over 13 acres, a tidal harbor of 35 acres, and a graving dock. Plymouth was used as a port by the Black Prince, and in the reign of Elizabeth was the principal port of England. In the wars with Napoleon it was the rival of Portsmouth in naval activity. From here the *Mayflower* sailed 1620. Pop. of Plymouth proper (1911) 112,042.

Plymouth, capital of Plymouth Co., Mass.; on Massachusetts Bay; 37 m. SE. of Boston; is the oldest town in New England. The industries comprise the manufacture of woolen cloth, cotton sail duck, insulated wire, patent bedstead joints, boots and shoes, cordage, tacks, rivets, wire nails, stoves, hollow ware, steel shanks, electrical supplies, and other articles. Plymouth is celebrated as the landing place of the Pilgrim Fathers on December 11 (December 21st N. S.), 1620. The rock on which they first stepped is now covered with a fine granite canopy. Pilgrim Hall contains numerous relics of the Pilgrims. Cole's Hill and Burial Hill are points of much interest, because of the burial there of many of the Pilgrims. The corner stone of a national monument to the Pilgrims was laid 1859, and the structure was dedicated, 1889. Pop. (1910) 12,141.

Plymouth Breth'ren, Christian body holding in the main Calvinistic views; founded in Dublin, 1827, mainly by John Nelson Darby, who had been a clergyman of the Established Church, from whom the sect gets its best-known name, Darbyites; 1831, took a fresh hold at Plymouth, England, whence its name, Plymouth Brethren; again under Darby, and largely by his writings and personal service spread over the British Isles, the Continent, Canada, and the U. S. The Brethren are divided into several parties, but all agree in rejecting creeds, an ordained ministry, and a separate organization, and in meeting in halls or private houses instead of having churches. In England they have twenty-three places of worship. In 1906 there were in the U. S. four parties, with an aggregate of 6,661 communicants.

Plymouth Sound, inlet of the English Channel on the S. coast of England, between Devon and Cornwall cos.; 3 m. long, 4 m. broad, and forms, with the estuaries of the Plym and Tamar, the harbors of Plymouth and Devonport, well known as one of the principal naval stations of Great Britain.

Pneumatics (nū-măt'ĭks), that branch of general mechanics which treats of the equilibrium and motion of aëriform fluids. As ordinarily understood, pneumatics treats of the action only of permanent gases, of which atmospheric air is the type; but the principles of this science can be so extended as to include the investigation of the elasticity and action of all vapors through all stages of condensation, down to the liquid condition. From the nature of gaseous bodies the following laws are derived: (1) Equal pressures in every direction are exerted on and by every portion of a gaseous body at rest; (2) a pressure made on a confined body of gas, as in a liquid mass, is perfectly transmitted in every direction, and in the atmosphere to great distances; (3) such pressure is proportional to the area of surface receiving it, and consequently multiplied when the receiving surface is larger than that communicating it; (4) pressure on a given surface at a given depth, due to weight, is calculated in a similar way; (5) the free surface of any such body, as the upper aërial surface, tends to a level at any place; and (6) within any body of gas, at any given depth, there is exerted a supporting or buoyant power, which is as the density or tension of the gas at the place.

The weight of a column of air resting on a horizontal square inch at the sea level is very nearly 14.6 lb.; and a pressure of this amount is termed a pressure of one atmosphere. The first pneumatic law, discovered by Boyle, 1650, and independently by Mariotte, 1676, and known as Boyle's or Mariotte's law, affirms that, at a given temperature, the volume of an aëriform body at rest is inversely as the compressing force—*i.e.*, to double the pressure on a gas will halve its volume; while four times the pressure reduces the gas to one fourth its original volume. The second great law of tension and pressure is that of Dalton and Gay-Lussac, 1801, by both of whom it was independently discovered, according to which, when the tension of a gas or vapor is constant, the density diminishes as the increase of temperature. The laws of Mariotte and Dalton have been modified by the discovery that vapors and nonpermanent gases undergo compression in a ratio greater than that of the increase of pressure upon them, and that near the point of liquefaction this deviation becomes very great. Or, the pressure remaining constant, the volume of a gas increases by $\frac{1}{273}$ with every rise of 1° C.

Aërodynamic problems, or those investigating the flow and delivery of gases through orifices, in tubes, and in currents, and the consequences of the impact and momentum of moving air, are too intricate to be presented fully except in special treatises. Torricelli's principle for liquids, that the velocity of discharge from an orifice is that which the body of liquid would acquire in falling freely from the height of its surface to the center of the orifice, applies quite as strictly to gases as to liquids.

Compressed air is extensively used in the building of bridge piers, of tunnels, and of foundations, where water or quicksand is to be excluded. It is also used for the transmission of small parcels, etc., through tubes, at high speed, and as a motive force for tools, etc. See AIR; GAS.

Pneumatic Transmis'sion, method of transmitting written messages and packages of goods through tubes by the pressure of the atmosphere or the action of compressed air. The operation of the apparatus may be illustrated by inserting one end of a small tube of glass or metal, containing a pellet of moistened paper, in the mouth. Upon forcing air into the tube the pellet will move from the experimenter, but if the air is drawn out of the tube the pellet will move toward the experimenter. These methods are used in all apparatus for pneumatic transmission, a compression or exhausting air pump being used for controlling the air and a hollow piston of leather or other suitable material for containing and carrying the message.

In the system of pneumatic transmission employed in all the large cities of Europe and in many places in the U. S. the articles to be conveyed are always within the tube, which extends from one station to another. Notwithstanding the success of pneumatic transmission in connection with the postal service of European nations, it was not until 1892 that the U. S. Govt. decided to give the system a trial, and a plant was laid down in Philadelphia. Since then the system has been applied to the postal service in several other large cities, for conveying matter from the general to substations. Pneumatic tubes have been used for many years by the Western Union Telegraph Company to convey messages from substations in New York City to the general office, and they are generally employed in the department stores and other large commercial establishments to convey money from the several sales counters to a central point and return change when necessary.

Pneumogas'tric Nerve, so called from its distribution to the lungs and stomach. An important nerve which issues from the skull by the jugular foramen, and then descends to the chest, and after entering the thorax lies upon the esophagus. It passes through the diaphragm, and is distributed to the stomach and solar plexus. The branches of the pneumogastric are sent to the pharynx, to the larynx, to the heart, lungs, esophagus, and stomach. Its most important function is the regulation of breathing. The action of the pneumogastric on the heart is checking or inhibitory, paralysis of the pneumogastric producing excessive rapidity of the heart's action (and slow respiration), while irritation of the nerve slows or stops the cardiac movements. The movements of the esophagus and stomach are under the control of the motor fibers of the pneumogastric.

Pneumo'nia, inflammation of the lung, popularly known as "lung fever." Pneumonia is a disease chiefly of adults, and more often of males. It results from infection by a specific microörganism, the *Diplococcus pneumoniæ,* when the system is rendered susceptible by chilling, exposure, fatigue. Pneumonia is therefore an infectious disease. The disease is announced by a heavy chill, high fever, rapid respiration, frequent pulse, flushed cheek —on the side of the affected lung; in severe cases by delirium. There is pain in the side and cough, with expectoration of mucus tinged with blood, and in grave cases dark sputa, resembling prune juice. After lasting from seven to ten days the crisis occurs, the fever suddenly falls, the breathing is slower, and the patient feels more comfortable. Acute pneumonia of adults, although grave, is usually curable, and, contrary to popular apprehension, seldom leads to consumption. Pneumonia in children is liable to leave portions of lung substance inactive, and may develop phthisis.

Pneumonia is variously treated. Locally, cold water and ice bags may abort or limit the inflammation. When established, warm applications, as poultices, cotton batting, and oil silk afford comfort and favor removal of the exudation from the air sacs. Stimulants and rich liquid diet to sustain strength are also employed.

Po (ancient, *Padus* and *Eridanus*), largest river of Italy, having its source in Piedmont, in two springs 6,560 ft. above the sea, on the E. side of Monte Viso, one of the Cottian Alps; flows E. for about 450 m. through the center of Piedmont and along the S. border of Lombardy and Venetia; enters the Adriatic by a delta of several branches. Receives a great number of tributaries both from the Alps and the Apennines, including the Tanaro, Ticino, Trebbia, Adda, and Mincio. The current is so rapid as to render navigation difficult. Destructive floods are liable to happen at all seasons, and the flat country along its lower course is protected by embankments. From the sediment deposited, the surface of the river is in some places 15 or 20 ft. above the adjacent country. Its basin includes an area of about 40,000 sq. m.

Pobiedonostzeff (pō-bē-dŏn'ŏst-zĕf), **Constantine Petrovitch,** 1827–1907; Russian official; b. Moscow; Prof. of Civil Law at Moscow, 1859–65, and tutor to the Czar Alexander III; created senator, 1868; elected to the Imperial Council, 1872; procurator of the Holy Synod, 1881–1905; obtained such influence over Nicholas II that for twenty-five years he prevented the proclamation of a constitution for Russia. He was popularly held responsible for the persecution of the Jews and the Christian sectaries; resigned office when the czar determined to grant a form of constitutional government, 1905; published "Course of Civil Law," a manual of civil procedure, "Reflections of a Russian Statesman."

Pocahon'tas, abt. 1595–1617; Indian woman of Virginia, daughter of Chief Powhatan; remarkable for her friendship for the English colonists, a striking evidence of which is said to have been given when she was about twelve

years old. Capt. John Smith was taken prisoner, and it was decided to put him to death. His head was laid on a stone, and the savages were brandishing their clubs preparatory to dashing out his brains, when Pocahontas threw herself on the captive's body, and her intercession with her father saved his life. Researches discredit this story. In 1613 she was married to John Rolfe, an Englishman. In 1616 she accompanied Sir Thomas Dale to England, where she was presented at court, and suddenly died when about to return. She left one son, Thomas Rolfe, who became a person of note and influence in Virginia.

Pocu'na. See BLOWPIPE AND ARROW.

Podes'ta, municipal magistrate in Italian cities; name formerly applied to the chief magistrates of Italian towns, appointed in troubled times with full dictatorial powers; was usually a stranger to all local factions, and during his term of office was prohibited by law from forming any intimate connection with the citizens over whom he ruled. He was appointed for a term of years, but sometimes became a permanent despotic ruler. The name first given to the German magistrates whom Frederick Barbarossa appointed over the Lombard cities.

Podiebrad (pŏd-yĕ'brăd), **George,** 1420–71; King of Bohemia; b. of a noble and wealthy Bohemian family; joined the Utraquists after the election of Albert of Austria to the Bohemian throne, 1438; distinguished himself by compelling Albert to raise the siege of Tabor. As leader of the Hussite party became Governor of Bohemia, 1444, during the minority of Albert's son, Ladislaus the Posthumous; and on death of Ladislaus was elected king himself, 1458. He aimed to reconcile the Hussite and Roman Catholic parties, and acted with some success; but the pope excommunicated him as a heretic, preached a crusade against him in Germany, incited his son-in-law, Matthias Corvinus, King of Hungary, to attack him, and even instigated his own Roman Catholic subjects to revolt against him. Podiebrad suppressed the insurrection, routed the German crusaders, defeated the Hungarians several times, and, in order to strengthen the anti-papal and anti-Hungarian party in Bohemia, induced his countrymen to elect Ladislaus, heir of the Polish crown, as his successor, while his two sons retired into the ranks of the nobility.

Podo'lia, former province of Poland; now a government of Russia, bordering on Austrian Galicia; area, 16,224 sq. m.; pop. (1907) 3,387,100; capital and only town of importance, Kamenetz; acquired by Russia in second partition of Poland, 1793.

Podophyl'lum and **Podophyllin.** See MAY APPLE.

Poe, Edgar Allan, 1809–49; American author; b. Boston, Mass.; son of actors, who died in his early childhood; was adopted by a wealthy citizen in Richmond, Va., and placed in a school at Stoke Newington, near London; entered the Univ. of Virginia, 1826, but was removed within a year, probably for gambling; went to Boston, 1827, and there issued his first volume, "Tamerlane and Other Poems." He enlisted in the U. S. army as a private under an assumed name, and was admitted as a cadet at West Point, 1830, but was dismissed, 1831; became editor of *The Southern Literary Messenger* at Richmond; removed to New York City, 1837; published, 1838, his first prose volume, "The Narrative of Arthur Gordon Pym"; edited in Philadelphia, 1839–40, *The Gentleman's Magazine,* and, 1841–42, *Graham's Magazine*; published, 1840, "Tales of the Grotesque and Arabesque." Removing to New York City, 1844, he published, February, 1845, in *The Whig Review* his best-known production, "The Raven"; became subeditor of *The Home Journal,* assistant editor and finally editor of *The Broadway Journal,* 1845–46; died and was buried in Baltimore, Md.

Poebird (pō'ē-bĕrd), bird of the subfamily *Meliphaginæ,* or honey eaters, and the genus *Prosthemadera.* The poebird, or tui (*P. novæ zealandiæ*) is a native of New Zealand and the Auckland Islands; about the size of a thrush, of a fine glossy black, with green and violet reflections; imitative, restless, and pugnacious; singing with sweet whistling notes; called in New Zealand the mocking bird; in confinement learns to speak long sentences with ease and fluency, and imitates a bark, mew, cackle, gabble, or any other sound.

Poerio (pō-ā'rē-ō), **Carlo** (Baron), 1803–67; Italian statesman; b. Naples; was exiled and repeatedly imprisoned after returning; 1848 was successively prefect of police and minister of education, and after the overthrow of the provisional government, in May, opposed the government in Parliament. In March, 1849, he was sentenced to twenty-four years' hard labor. Mr. Gladstone, while in Italy, 1851, vehemently denounced the injustice of his trial and the rigor of his prison life. At the end of 1858 he was released on condition of going to the U. S.; but the vessel landed him in England, whence, 1859, he returned to Italy. In 1860 he was elected to the Parliament of Turin; was one of the noblest of the Italian patriots.

Po'et Lau'reate, poet officially crowned with laurel. The custom of crowning poets successful in a musical contest originated among the Greeks, and was adopted by the Romans during the empire. It was revived in the twelfth century by the Emperor of Germany, who invented the title of poet laureate. The French had royal poets, but no laureates. The title existed in Spain, but little is known of those who bore it. The tradition concerning the laureateship in England is that Edward III, 1367, emulating the crowning of Petrarch at Rome, 1341, granted the office to Chaucer, with a yearly pension of 100 marks and a tierce of Malvoisie wine. In 1630 the laureateship was made a patent office in the gift of the lord chamberlain, the salary was increased from 100 marks to £100, and a tierce of Canary wine was added, which was commuted in the time of Southey for £27 a year. From that

time there has been a regular succession of laureates. The following is the list:

Ben Jonson	1630–1637
William Davenant	1637–1668
John Dryden	1670–1688
Thomas Shadwell	1689–1692
Nahum Tate	1693–1714
Nicholas Rowe	1714–1718
Lawrence Eusden	1719–1730
Colley Cibber	1730–1757
Wm. Whitehead	1758–1785
Thomas Warton	1785–1790
Henry James Pye	1790–1813
Robert Southey	1813–1843
Wm. Wordsworth	1843–1850
Alfred Tennyson	1850–1892
Alfred Austin	1896–

Po'etry, term used in a double sense—the one, especially English, nearly synonymous with "verse," and forming the opposite to "prose"; the other, descending from the Greek literature, denoting all creations of the imagination irrespective of their form, verse or prose, literature or art, and forming a correlative to "science." The former sense has fallen almost entirely out of use in the literature of continental Europe; the latter was not introduced into English literature until recently, but is gaining ground rapidly. The varieties of poetry are numerous and not rigidly distinguishable from one another. At the same time each has in a sense an organic life of its own, and corresponds with some accuracy to a human interest or function. The chief poetic forms are didactic, dramatic, epic, epigrammatic, hymnological, lyric, pastoral, romantic, and satirical, and the ballad, ode, and sonnet. See LYRIC POETRY; PASTORAL POETRY; PROSODY; RHYME; VERSE.

Pog'gendorff, Johann Christian, 1796–1877; German physicist; b. Hamburg; edited the *Annalen der Physik und Chemie*, one of the first scientific journals of Germany, 1824–74. He became Prof. of Natural Philosophy at Berlin, 1834; joined Liebig in editing a "Dictionary of Chemistry," and wrote a pocket dictionary of the history of the exact sciences.

Poggio Bracciolini (pŏj'ō brăt-chō-lē'nē), **Giovanni Francesco,** abt. 1380–1457; Italian scholar; b. near Arezzo; was apostolic secretary to several popes; became Chancellor of Florence, 1453. His "History of Florence" extends, 1350–1455. Among most finished productions is his "Dialogue on Nobility." He discovered in ancient monasteries seven orations of Cicero and other classical writings.

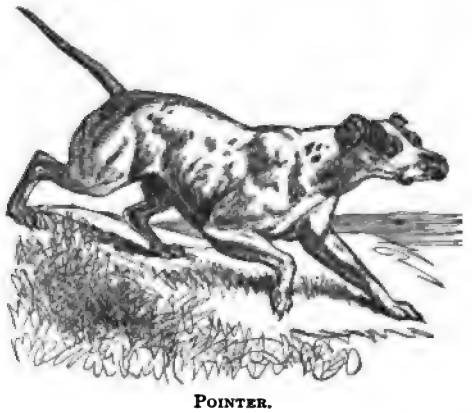
Pogod'in, Mikhail, 1800–75; Russian historian; b. Moscow; professor there, 1833–44; after which he collected Russian and Slavic antiquities. His principal works include "The Character of Ivan the Terrible," "The Complicity of Godunov in the Murder of Demetrius," "The Historical Basis of Serfdom," and "The First Seventeen Years of the Reign of Peter the Great."

Point Al'phabet. See BLIND, EDUCATION OF THE.

Point de Galle. See GALLE.

Pointe-à-Pitre (pwăńt-ä-pētr'), chief port of island of Guadeloupe, W. Indies, on SW. coast of Grand-Terre, at S. entrance of the Salée River; is well and regularly built, with broad, well-paved streets; harbor is one of the best and safest in the W. Indies. Pop. (1906) 14,861.

Point'er (*Canis avicularis*), sporting dog belonging to the race of hounds, which it resembles in general aspect, character, and colors. Their habit of standing fixed and pointing to game is the result of a long course of severe training. The hair of the pointer is smooth, sometimes marked like the foxhound's, but generally with more spreading dark colors, and some of the best breed are entirely black.



POINTER.

Poi'son. Poisons are classified with reference to their source, as (1) animal, (2) vegetable, (3) mineral, and also with reference to their method of action: (1) Corrosive and irritant poisons, such as corrode or inflame the stomach; (2) narcotic and sedative poisons, which, being absorbed by the mucous membrane, enter the blood and act on the nerve centers. The corrosive poisons are: (1) Acids—oxalic, hydrochloric, sulphuric, nitric. (2) Strong alkalies—ammonia, caustic potash, and soda. Alkaline earths—baryta and lime. (3) Metallic and other bases and their salts—corrosive sublimate, arsenic, sulphate of copper, tartar emetic, acetate of lead (sugar of lead), sulphates of iron and zinc, nitrate of silver, phosphorus, iodine, creosote, carbolic acid. The narcotic and sedative poisons are chiefly opium, belladonna, stramonium, hyoscyamus, aconite, digitalis, veratrum, tobacco, lobelia. Chloral hydrate is anæsthetic and depressant in large doses. Hydrocyanic acid depresses the heart or is immediately fatal. Strychnine and nux vomica act specifically on the nervous system, causing muscular rigidity and spasmodic contractions. Poisons are often taken with suicidal intent, by accident, as by children, or by adults erroneously as medicine or drink, and when carelessly dispensed by druggists, as oxalic acid instead of salts, morphine or strychnine instead of quinine. The symptoms of poisons are chiefly extreme disturbance of the stomach, breathing, and pulse, often with impairment of sight and great bodily weakness, pallor, and

cold surfaces. Corrosives and irritants cause burning pain in stomach.

Antidotes for poisons should be given immediately, while waiting the arrival of a physician. For poisoning by acids give alkalies—solutions of soda, potash, lime, ammonia; afterwards white of eggs and sweet oil to soothe the stomach. For poisoning by alkalies, give dilute acids, as vinegar or lemon juice, and olive oil, which unites with the alkalies to form a soap and renders them inert; for corrosive sublimate, white of eggs and wheat flour; for arsenic, the hydrated peroxide of iron, kept by most druggists and many physicians. It can be made by adding aqua ammonia to liquor ferripersulphatis, or even to common tincture of iron; the resulting precipitate is to be used in tablespoonful doses. The new dialyzed iron is a ready and efficient antidote; magnesia may be used if no other remedy is obtainable. For sulphate of copper, white of eggs, milk, flour; for tartar emetic, oak bark, tannin; later, opium to allay pain in the stomach. For sugar of lead (acetate of lead), sulphate of magnesia, making an inert sulphate of lead in the stomach and system; for sulphate of iron (copperas) and sulphate of zinc, bicarbonate of soda, freely given; for nitrate of silver, common salt, freely given, converting it to chloride of silver; for phosphorus, a mustard emetic; later, opium and ice, to quiet the stomach; for iodine, boiled starch; for creosote and carbolic acid, olive oil and white of eggs.

In opium poisoning (opium, laudanum, morphine, and paregoric), emetics, as sulphate of zinc or copper, the stomach pump, frequent draughts of strong coffee, constant exercise, as walking, to prevent sleep; belladonna by the mouth, atropine hypodermically, and the electric battery to the diaphragm and chest, to keep up breathing; for belladonna, opium; for stramonium, hyoscyamus, aconite, digitalis, veratrum, tobacco, and lobelia, alcohol freely, to restore the pulse; for chloral hydrate, alcohol and the electric current. Hydrocyanic acid is usually instantly fatal; in small doses it depresses the pulse, and alcohol is the remedy. Poisoning by wild fruit and berries is usually due to the sedative effect of their juices, and demands vomiting and alcohol to sustain the heart; so, also, in poisoning by the flesh of pigeons or game which has fed on wild berries. Strychnine (and nux vomica) poisoning requires inhalations of chloroform and chloral by the mouth or hypodermically. See ANTIDOTES; NARCOTICS; TOXICOLOGY.

Poison I'vy. See RHUS.

Poisson (pwä-sōn'), **Simeon Denis,** 1781–1840; French physicist; b. Pithiviers; became professor in École Polytechnique, president of Bureau of Longitudes, counselor of the university and peer; made remarkable researches in the theory of definite integrals; applied the higher mathematics to mechanics and molecular physics; wrote about 300 memoirs; most important works, "Treatise on Mechanics," "New Theory of Capillary Action," and "Mathematical Theory of Heat."

Poitiers (pwä-tyā'), ancient *Lemonum*, town of France; former capital of Poitou; now department of Vienne; at junction of the Clain and Boivre rivers; 180 m. SW. of Paris; has a celebrated lyceum, theological seminary, public library, and other educational institutions. The Cathedral of St. Peter was begun by Eleanor of Guienne, 1162, on the ruins of a Roman basilica, and completed in the fifteenth century. The Church of St. John, originally a baptistery (abt. 700), is the oldest Christian building in France. In 1882 the remains of an entire Gallo-Roman town were discovered here; they comprise a temple, baths, and streets, spread over 14 acres. Near here Edward the Black Prince defeated and captured King John of France, 1356. Pop. (1906) 39,302.

Poitiers, Dia'na of. See DIANA OF POITIERS.

Poitou', former province of France; now divided into the departments of Deux-Sèvres, Vendée, and Vienne; became an English possession, 1152, on the marriage of Eleanor, Countess of Pitou, and Henry of Anjou, afterwards Henry II of England. In 1204 Philip Augustus took it from England, and although it once more reverted to that country, 1360, by the Peace of Brétigny, it was soon after reconquered, and finally incorporated with the possessions of the French crown.

Poke. See GARGET ROOT.

Pok'er, game at cards, played with a full pack by from two to six persons. Five cards are dealt each player, one at a time. The eldest hand (*age*) deposits a certain number of chips (tokens which represent money, unless the game is played for amusement), called the *ante*; the others in turn either deposit twice this amount (*i.e., go in*), or withdraw (*pass*). If they all pass, the eldest hand takes back the ante and deals a new hand; otherwise he either doubles his original stake or withdraws, forfeiting his ante. The players who have gone in then in turn discard as many cards as they wish, and receive the same number of new cards from the pack. The player at the left of the eldest hand then bets any amount not exceeding a limit previously agreed upon, or passes out and forfeits the stake already in the pool. The next player either *sees* him (bets a like amount), *goes better* (bets in addition to this a sum not exceeding the limit), or passes out. This continues till one player forces the others out and takes the pool, or until all the other players in see the last raise (none going better), and *call*. They then show their hands, and the strongest hand wins the pool.

Hands rank in strength as follows, beginning with the highest: (1) *Straight flush* (sequence of five cards in the same suit); (2) *four of a kind* (accompanied, of course, by an odd card); (3) *full*, or *full house* (a triplet and a pair); (4) *flush* (five cards of the same suit); (5) *straight* (five cards in sequence); (6) *triplet*, or *three of a kind*; (7) *two pairs*; (8) *one pair* (two cards of the same denomination, the other three being of different ones). The denominations of cards rank in value as in whist (except that in the

straight and straight flush the ace may rank either above the king or below the deuce).

The game above described is the simplest form of draw poker. In *straight poker* no discard is made, and all the players must stake the ante. In *whisky poker* an extra hand is dealt, and the players strive to improve their hands by exchanging cards with it in turn. In *stud poker* all cards, except the first dealt, are laid face up on the table.

Po'la, town of Istria, Austria; 54 m. S. of Trieste; is the most important naval station of Austria-Hungary; has a deep and spacious harbor, almost completely landlocked; arsenal, docks, artillery stores, etc. The hills surrounding the harbor are crowned with forts and batteries. Pola has considerable shipping trade, exporting fish, timber, and the sand used in making Venetian glass, and importing coal and provisions. Besides the citadel, which overlooks the town and the bay, the chief buildings are the cathedral (fifteenth century), Franciscan convent (thirteenth century), and the infantry barracks. There is a naval observatory, founded 1871, where planetoids were discovered, 1874–80, by I. Palisa. In the suburb of San Policarpo is a park with a monument to the Emperor Maximilian of Mexico. Pola occupies the site of the ancient Pietas Julia, of which it contains several interesting remains; a well-preserved amphitheater, which could accommodate about 20,000 spectators; a triumphal arch, etc. Pop. (1907) 39,688.

Po'land, John Scrogg's, 1836–98; U. S. army officer; b. Princeton, Ind.; graduated at West Point; with Army of the Potomac at Bull Run and until after battle of Gettysburg; Asst. Prof. of Geography, History, Ethics, and Drawing at West Point, 1865–69; on frontier duty, 1869–79; chief of law department U. S. Infantry and Cavalry School, in Leavenworth, Kan., 1881–86; published "Digest of the Military Laws of the United States from 1861 to 1868," "The Conventions of Geneva of 1864 and 1868," and "St. Petersburg International Convention."

Poland (Polish, POLSKO), former kingdom of Europe; about middle of the seventeenth century extended from the Baltic to the Carpathian Mountains; bounded W. by Prussian provinces of Pomerania, Brandenburg, and Silesia; N. and E. by Russian governments of Livonia, Pskoff, Smolensk, Chernigoff, Poltava, and Kherson; area, nearly 300,000 sq. m.; pop. est. at 12,000,000; first partitioned between Austria, Prussia, and Russia, 1772; second, between Prussia and Russia, 1793; third, between Austria, Prussia, and Russia, 1795; remainder of territory incorporated with Russia, 1868; now divided into governments of Kalisz, Kielce, Lomza, Lublin, Piotrkow, Plock, Radom, Siedlce, Suwalki, and Warsaw; area, 49,018 sq. m.; pop. est. (1907) 11,138,700; capital, Warsaw. This territory belongs to the central plain of Europe, and is crossed by only one range of hills, which form a watershed between the rivers flowing into the Baltic and Black Seas. Chief rivers, the Vistula, Bug, Niemen, Dwina, Dnieper, and Dniester. Large tracts are covered with swamps, sand, and forests, but generally the soil is a light loam, well suited for agriculture and pasturage. For many centuries large herds of cattle, horses, and swine have been reared here; and cereals, hemp, timber, honey, and wax have been produced. There are extensive mines of salt, and a few of iron, copper, and silver. The bulk of the present inhabitants consists of Poles, but there are several other races, including Germans, Lithuanians, and Jews, each of which numbers over 2,000,000.

The Poles belong ethnologically to the Slavic family. They appeared first in history in the fifth century under the name of Poliani, occupying the plain between the Oder and the Vistula, along with other Slavic tribes, which in the course of time they partly subdued and absorbed.

About 750 they substituted a chief magistrate, under the title of duke, for the petty chiefs that had been governing them. In 999 Duke Boleslas, who had achieved great fame by military conquests, was given title of king by Otho III, Emperor of Germany. He and his successors belonged to the Piast dynasty, which became extinct 1370; was followed by the Jagellon dynasty, extinct 1572, when Poland became an elective monarchy. Livonia was ceded to Sweden, 1660, and much territory E. of the Dwina to Russia, 1667. Three princes of the Swedish Vasa dynasty—Sigismund III, Ladislaus IV, and Casimir John II—ruled 1587–1668. John Sobieski (1674–96) delivered Vienna from the Turks, but obtained no benefit for his own country. Under Augustus II (1697–1704, 1709–33), and Augustus III (1733–63) Poland was united with Saxony. On the death of the latter, a monarchist or reforming party, aided by Catharine II of Russia, placed Stanislaus Augustus Poniatowski on the throne. Another party, headed by the family of Potocki, who maintained the old monarchical institutions, now opposed the Russian influence, and the Confederation of Bar (in Podolia) was formed, an army assembled, an alliance with the Turks made, and Stanislaus deposed. Russian, Austrian, and Prussian armies now entered Poland and the first partition was effected, Russia taking 42,000 sq. m.; Prussia, Posen, and Austria, Galicia.

The whole country was now aroused to a sense of danger. The *liberum veto* was formally suppressed and many reforms were made; but some of the nobles were discontented at the loss of their privileges, and formed the Confederation of Targovitza, 1792. At their instigation Russian troops entered Poland again. Prussia now joined the Russians, and a fruitless resistance, headed by Joseph Poniatowski and Kosciusko, resulted in a second partition. Russia took 96,000 sq. m. and Prussia 22,000 sq. m. A general rising in all the Polish provinces was the consequence, and the Russians and Prussians were compelled to retreat; but at the critical moment Austria came on the scene and turned the balance. Kosciusko was taken prisoner at the battle of Maciejowice, Warsaw capitulated to Suwarow, the king resigned his crown, and the third par-

tition, 1795, put an end to the political existence of Poland. The subsequent wars of the French with the enemies of Poland caused the Poles to support Napoleon, but all that he accomplished was the formation of the duchy of Warsaw, 1807. By the Congress of Vienna, 1815, Austria's share of Poland was diminished, and Prussia received less than it had after the second partition. The greater part of the duchy of Warsaw was united, as the Kingdom of Poland, to the Russian Empire, but only by the bond of a common monarch. Thus finally Russia obtained 220,500 sq. m. Although Alexander I granted the so-called Kingdom of Poland a constitution, with a responsible ministry and a separate army, an insurrection occurred, 1830, which caused Russia to declare Poland an integral part of her empire. Uprisings took place 1846 and 1863; and, 1864, Poland was deprived of its last remnant of independence. In 1914 Russia promised the Poles to restore their autonomy; but nothing favorable to Poland resulted from this pledge. In the World War the Germans occupied the territory from an early date to Nov. 11, 1918, when on their withdrawal they stripped the sorely stricken country of all industrial materials, machinery, etc., causing a general damage that it was estimated fully $2,000,000,000 would be required to replace. For the formation of the independent republic of Poland and the German concessions to it, see PADEREWSKI, IGNACE JAN.

Polar Clock, instrument invented by Wheatstone, which when accurately adjusted indicates the apparent solar time within a very few minutes; operates even when the sky is overcast with clouds, provided there be an unobscured spot at the pole through which the blue sky may be seen. It applies the fact that the plane of polarization of sky light is always 90° from the sun.

Polar Explora'tions. See POLAR RESEARCH.

Polariza'tion, in optics, certain modifications in the character of the wave motions to which light is due. These modifications arise under certain conditions from reflection, refraction, etc. They are the source of some of the most beautiful and interesting phenomena. A beam of light from a self-luminous source, when passing through a homogeneous medium, exhibits the same properties on all sides so long as it does not meet with an obstacle; such a beam is composed of ordinary or natural light. But after it has been reflected or refracted, it has lost some of its properties; some of its rays have been quenched. When the reflection takes place at a certain angle, nearly all the rays except those lying in a certain plane will have been obliterated. If the ray, having been thus reflected from a glass mirror, be received obliquely on another glass mirror, and the latter turned around the ray, care being taken not to change the angle of incidence, the intensity of the twice-reflected beam will vary as the position of the mirror is changed. If the second mirror is so placed that its plane of reflection is parallel to the plane of reflection from the first surface, the ray will be reflected without being diminished. But if the second mirror has its plane of reflection perpendicular to that of the first, the ray will not be reflected, or its intensity will be greatly reduced. When a ray of light from a luminous source falls on a glass plate at the polarizing angle, that portion of it which is refracted is also partially polarized. If that which has passed through one plate is afterwards transmitted through several in succession having their surfaces parallel, the polarization may be made tolerably complete. The planes of polarization of the reflected and the refracted rays are at right angles to each other, as are the planes of polarization of the ordinary and extraordinary rays in Iceland spar.

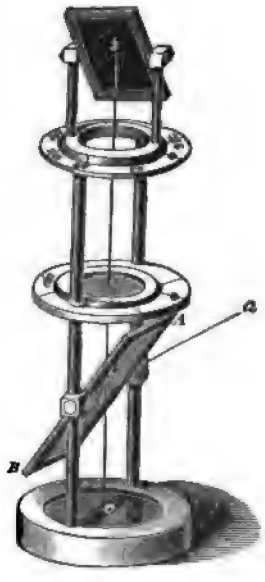


FIG. 1.

If two plates of crystal tourmaline, which has been cut in sections parallel to its axis, are laid at right angles on each other, as in Fig. 2, the combination will be opaque; if placed diagonally, as in Fig. 3, the opacity will be partial; and if they are placed parallel to each other, as in Fig. 4, the light will pass through both as if they formed one piece. The light in passing through the first plate of tourmaline has been polarized, its vibrations having been reduced to one plane. Therefore, in order that all the rays which have passed through the first plate may pass through the second, the axes of the two must be parallel.

FIG. 2.

FIG. 3.

FIG. 4.

Various pieces of apparatus are used for investigating the properties of polarized light, but they always consist of two principal parts, a polarizer and an analyzer. In the case of the tourmaline plates, Figs. 2, 3, and 4, that through which the light first passes is the polarizer, and the other the analyzer. The reflecting polariscope is frequently given the form shown in Fig. 1, an arrangement in which the lower mirror is a plate of clear unsilvered glass. Rays of light reaching the mirror from the direction of *a* are polarized by reflection, and thrown downward upon the mirror *c*, whence they are returned vertically upward

through A B to the analyzer S, which is a mirror of black glass. The analyzer revolves within a graduated circle by means of which its position can be determined. An adjustable platform between the two mirrors supports objects the behavior of which when subjected to polarized light is to be studied.

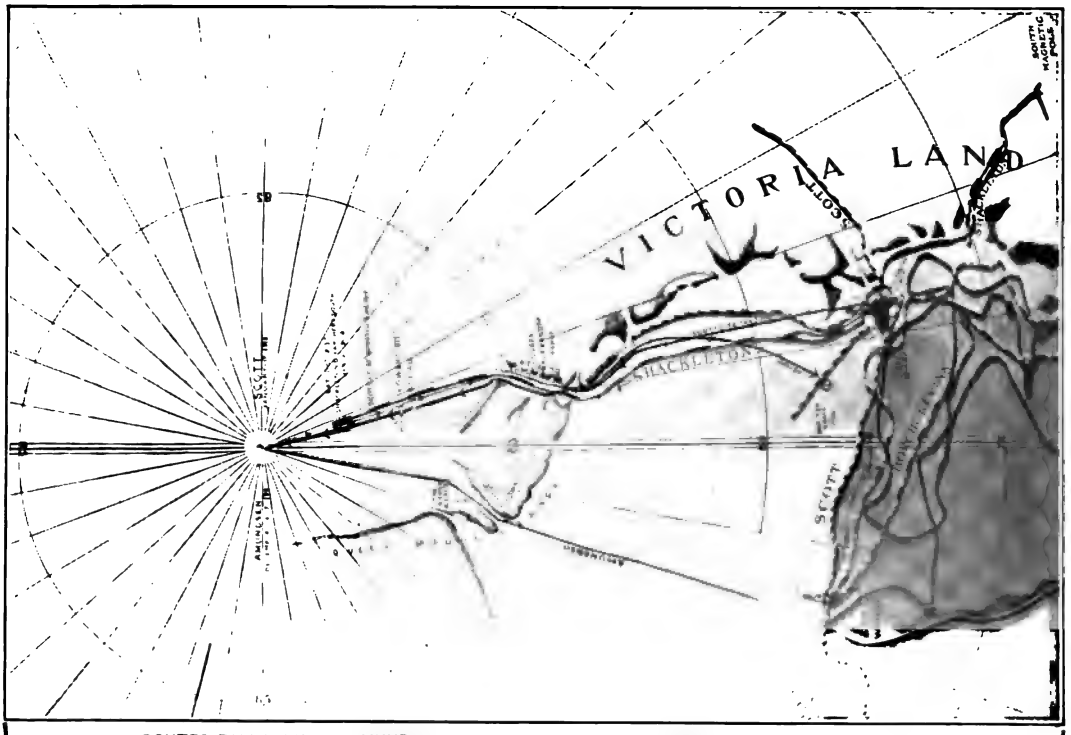
Po'lar Re'gions, regions situated near the N. and S. poles. The chief results of exploration in those quarters of the globe are the following: Each terrestrial pole is covered by a cap of continuous ice, which remains unbroken on the land areas and apparently over the smaller inclosed water areas of extreme high latitudes, and these caps vary in size with the season and with the year. Greenland is covered with an unbroken ice sheet, and so probably is also the S. continent. Around the margin of these caps is an area of variable width covered with floating ice, either derived from the frozen surface of the ocean when it forms the pack, the ice fields or the floebergs, or derived from the sheet of land ice when it forms icebergs. This area is more or less open, and at its outer margin is very open, irregular, and variable. Floating ice extends farther toward the equator in the Atlantic than elsewhere. In the N. Atlantic it may float as far S. as lat. 42° N. and in the S. Atlantic to lat. 39° S. In general the surface currents of the ocean flow away from the ice caps. An exception is found in the Antarctic field, where S. of New Zealand a current sets in toward the great bay in this field. Another is in the Arctic field, where the Gulf Stream extended enters the Arctic to the N. of Scandinavia.

The entire Arctic area (extending far S. in Siberia and N. America) has a mean annual temperature of 32° or lower, except the NE. coast of Norway and a coastal strip of small size on E. Greenland. The seasons are reduced to two, summer and winter, and the diurnal changes are relatively slight. The greatest cold in winter is in the Yana basin, where the mean temperature for January descends to —50° F. or lower. The July mean temperatures run from 36° F. in the vicinity of the pole to about 50° F. near the Arctic circle. The precipitation about the pole is small, varying from 8 to 25 in., and is somewhat more likely to fall in late summer than at other seasons. The accumulations of ice and snow are due to the conservation of what has fallen. It is largely in the form of snow, and evaporation is small because of the low temperatures. Fog and high winds are common. The N. magnetic pole was found by Ross to be on Boothia Felix in 1831. It has since traveled a few degrees E. and is now near the SE. angle of this peninsula, at about lon. 70° 5′ N., lat. 96° 44′ W. The S. magnetic pole was found by a party under the direction of Lieut. (now Sir) Ernest H. Shackleton in 1909, in a hitherto unexplored area S. of Australia and in lat. 72° 25′, lon. 15° 4′ E. Arctic researches have given opportunity for many studies of the aurora. The center of greatest frequency is in NE. America.

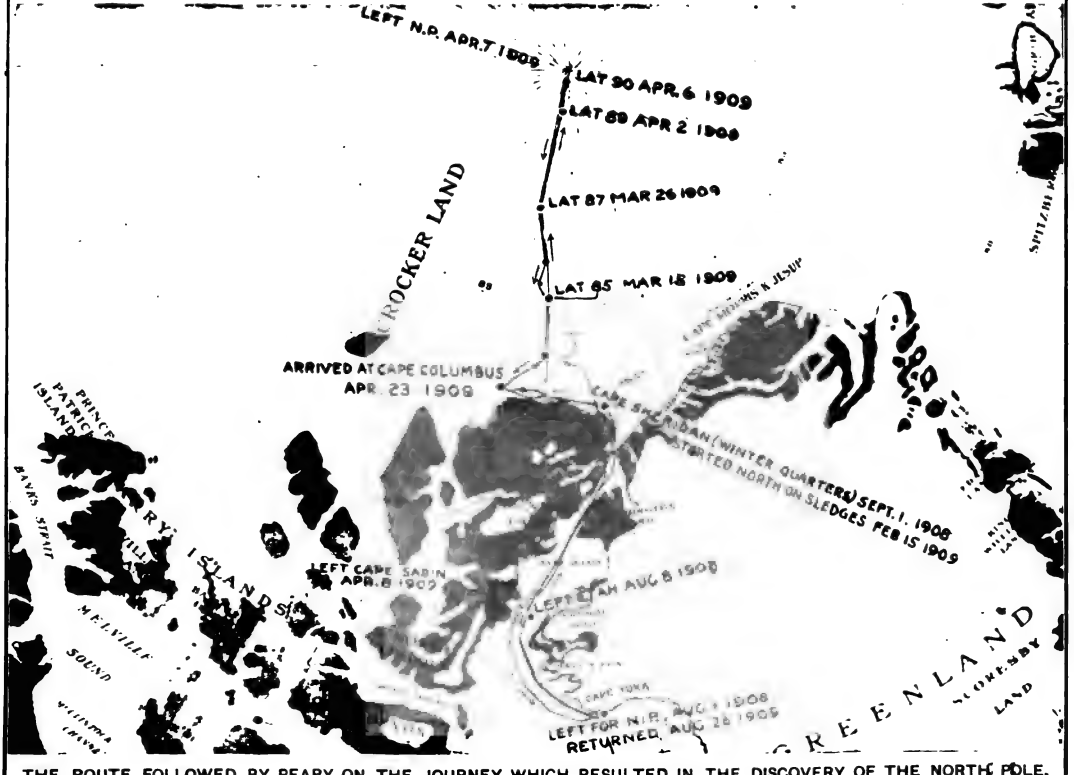
The geology of the Arctic region is diversified. Certain Cretaceous and Tertiary strata in Spitzbergen, N. Greenland, and the Arctic Archipelago show that in Cretaceous times this area had a subtropical climate with a luxuriant flora, something like that now found in S. Japan. Fossils obtained in the Antarctic region show that this also had at one time a warm climate. Volcanic action is seen only about the S. pole. The flora of Arctic regions is scanty. Willows, dwarf birches, and a few other shrubs extend to S. Greenland, and a dwarf willow extends far N. The flowering herbs of high latitudes are few. Beyond these are found only mosses, algæ, and lichens. The Antarctic flora is more scanty than the Arctic. In the Arctic regions animal life is relatively abundant. N. of lat. 81° are found the Arctic bear, the wolf, two species of fox, the reindeer, musk ox, etc.; also three species of seal, two of whale, the swordfish, and the narwhal. Thirty-two species of birds have been observed N. of 81° 31′ N., and the most of these have also been seen at Point Barrow and on Nova Zembla and Spitzbergen. The rock ptarmigan is the only winter resident. There are also many fish and lower marine forms and insects. The Antarctic region has generally been represented as swarming with the marine forms of animal life. Here have been found five species of whale, four of seal, and twenty of birds, penguins being numerous.

The Antarctic area is uninhabited by man, as also are Nova Zembla, the New Siberian Islands, Franz Josef Land, Spitzbergen, Jan Mayen, and the Arctic Archipelago, but on the coasts of the last named are many evidences of a former occupation by the Eskimo. The Lapps occupy the Arctic coasts of Europe W. of the White Sea, and the Samoyeds E. to the Yalmal Peninsula. From the Kolyma mouth to Bering straits the coast is occupied by the Chukchees, who also extend S. about the Anadyr Gulf. The Arctic coast of America, both sides of Baffin Bay, and Davis Strait, and the SE. coast of Greenland are occupied by Eskimos. The extreme N. of these are the Arctic Highlanders, who occupy the W. shore of Greenland to the N. of Melville Bay. They now reach in their migrations no higher N. than lat. 79°, but traces of their former occupation can be found farther N. and on Grinnell Land. See POLAR RESEARCH.

Polar Research', exploration of the regions about the poles of the earth. The older attempts were devoted to finding a NE. or NW. passage, or to reaching the geographic or magnetic poles. They were unsuccessful, except in finding the N. magnetic pole, and they did not add greatly to knowledge. Sir Hugh Willoughby, an English navigator, attempted, 1553, to find a route to China and India by the N. of Europe and Asia. Two of his ships reached Kalguev Island, but were never heard from afterwards. The third reached the mouth of the Dwina in safety, and the White Sea was opened to British commerce. Later, Stephen Burroughs reached Vaygach Island, and, 1580, Pet and Jackman penetrated the Kara Sea. Barents, a Hollander, reached Nova Zembla, 1594, discovered Spitzbergen, 1596, and reached a lat-



ROUTES FOLLOWED BY AMUNDSEN AND SCOTT IN THEIR JOURNEYS TO THE SOUTH POLE.



THE ROUTE FOLLOWED BY PEARY ON THE JOURNEY WHICH RESULTED IN THE DISCOVERY OF THE NORTH POLE.

THE REGIONS ABOUT THE NORTH AND SOUTH POLES.

itude of at least 80° N. In the seventeenth century Franz Josef Land was apparently reached by a whaler named Roule. Attempts to penetrate farther E. than Nova Zembla and the Kara Sea were unsuccessful until 1878–79, when the passage was made by Nordenskjöld. Journeying from Spitzbergen, Hudson, 1607, discovered Jan Mayen. The sea to the N. being usually blocked by ice, expeditions were undertaken on sledges; the highest latitude reached in this way was 82° 45′ N. by Parry, 1827.

The greatest activity in Arctic exploration has been to the N. of the American continent in the Arctic Archipelago, and especially along the W. coast of Greenland. This coast was apparently visited by Nicolas and Antonio Zeno, Venetians, in the fourteenth century. It also offered the problem of the Northwest Passage, corresponding to that of the Northeast. Sebastian Cabot unsuccessfully searched for this passage, 1498, and was followed, 1576, by Frobisher. The search was actively continued by Davis, Hudson, Ross, Parry, Richardson, Franklin, and others. The geographic results of the search for Franklin were very rich, and the complicated and ice-covered Arctic Archipelago was explored.

Hayes was convinced that an open sea exists about the pole. He returned, 1860, and reached the lat. of 81° 35′ N. by way of Smith Sound, but did not find the open sea. For the winter 1882–83, by international coöperation, stations were established within the Arctic and Antarctic circles, chiefly to carry on meteorological and magnetic observations. The extreme N. of these was that established, 1881, at Lady Franklin Bay, on the E. coast of Grinnell Land, in lat. 81° 44′ N., under the charge of Greely.

The search for the Northwest Passage was officially terminated in 1853 upon its discovery by Sir Robert McClure. Records recovered by McClintock in 1859, however, show that its discovery by a more southerly route was made by John Franklin in 1847. But neither of these explorers ever fully traversed the passage. This feat was first accomplished by Capt. Roald Amunsden, a Norwegian, who sailed from Christiania in June, 1903. He stopped for investigations at the magnetic pole, but found no decided change from the magnetic conditions observed by Ross in 1831. Taking the more southerly passage discovered by Franklin, he completed his journey in August, 1906.

Up to December, 1894, the extreme N. point reached by civilized man was on the N. coast of Greenland, in lat. 83° 24′, gained by a party under Lieut. Lockwood. In 1893–96 Nansen penetrated to lat. 86° 175′. In 1894–97 Fred. G. Jackson discovered a number of islands and Victoria Sea N. of Franz Josef Land. During 1891–92 Peary determined the insularity of Greenland, and, 1898–1902, attained what was then highest N. in the W. Hemisphere (83° 39′). The Duke of the Abruzzi, 1899–1900, reached 86° 33′ N. Peary, 1906, reached 87° 6′ N., by way of Smith Sound, traced the N. coast of Grant Land, and discovered new land in about 100° W. Meanwhile, 1897, Andrée, a Swedish aëronaut, had attempted to reach the pole by balloon from Spitzbergen, but has never returned.

On July 6, 1908, the *Roosevelt*, equipped by the Peary Arctic Club and commanded by Peary, left New York on the trip which resulted in the discovery of the N. pole. The expedition wintered near Cape Sheridan. The sledge expedition left the *Roosevelt* in three divisions on February 15th, 21st, and 22d. They united later at Cape Columbia. The total of the three divisions comprised 7 white men, 59 Eskimos, 23 sledges, and 140 dogs. When they reached 84° N. lat. part of the party was sent back and 16 men, 12 sledges, and 100 dogs pushed forward on a quick march. On April 6th Peary, accompanied by a negro (Matt Hansen) and 4 Eskimos, reached the pole. He found the pole, as has been supposed for many years, to be surrounded by a continuous ice field. He found a temperature of 33° below zero. The bottom of the sea at that point was not found by a sounding of 9,000 ft.

The lands of the Antarctic region were unknown and unsuspected until 1773–75, when they were discovered by Cook, who showed that the S. continent was isolated and almost entirely within the Antarctic circle. In 1819 an English whaler, William Smith, was driven S. of the Falkland Islands to S. Shetland. In the early part of the nineteenth century the Messrs. Enderby, of London, interested in whaling, instructed their captains to explore as far S. as possible. Their Capt. Briscoe, 1831, discovered Enderby Land, about one third of a circle E. from S. Shetland and forming the second angle of the triangular S. continent. In 1832 he discovered and landed on Adelaide Island. He was apparently the first man to set foot on the S. continent. In 1838 their Capt. Balleny discovered the third angle of this continent in what is now known as Wilkes Land. In 1839–43 the Antarctic region was visited by a U. S. expedition under Wilkes, a French one under d'Urville, and a British one under Ross. Ross penetrated to 78° S. in the latitude of New Zealand, and discovered the mountainous district of Victoria Land, terminating to the S. in the active volcano Mt. Erebus, 12,000 ft. high.

In 1895 Carsten E. Borchgrevink, of Norway, set foot on the mainland of S. Victoria Land; 1897, attempted to reach the S. Pole without success; and returning to London, 1900, reported having reached lat. 78.5° S., lon. 195.5° E. A Belgian expedition under Lieut. De Gerlache passed the first winter ever spent by men in the Antarctic regions, 1898–99, and their vessel was frozen in the ice a full year, drifting with it between 70° and 71° 36′ S. lat. and 85° and 103° W. lon. Dr. Otto Nordenskjöld, of Sweden, headed an expedition, 1901–4, to Cape Seymour, about 800 m. SE. of Cape Horn, and there discovered fossils which indicated a previous warm climate. An English expedition under Capt. R. F. Scott, 1901–4, explored the inland ice of Victoria Land and reached 82° 17′ S. In 1902–3 a German expedition under Prof. Von Deygalski discovered in lat. 66° 2′, lon. 89° 48′ E. a point

of land which was named Gaussberg, while the land itself was named after the Emperor William. A British national expedition, 1903–5, explored in the regions SE. of Cape Horn, and drifting to the E. along the ice barrier discovered land between 155° and 150° W., which was named King Edward VII Land. It also determined the features of a large part of S. Victoria Land. A Scottish expedition under Dr. W. S. Bruce, 1903–4, surveyed some 4,000 m. of unexplored sea to the SE. of Cape Horn, and discovered land S. of Weddell Sea. In 1903–4 an expedition under Nordenskjöld mapped King Oscar II Land and other islands as far as the sixty-sixth parallel. A French expedition under Dr. Charcot, 1904–5, proved the connection of Bismarck Strait with the sea E. of Graham Land, and mapped the W. coast of that land. In January, 1909, a few days before one of his parties reached the S. magnetic pole, Shackleton gained a point within 111 m. of the S. pole. He reported that the Pole is situated on a high plateau about 10,000 ft. above sea level, and that the remarkable floating ice barrier stretching for 500 m. between King Edward VII Land and Victoria Land does not apparently reach beyond the eighty-third degree. He also discovered new land and mountain ranges extending from S. Victoria Land, thus confirming the discoveries made by the American Wilkes nearly seventy years before. In November, 1910, Capt. R. L. Scott left Port Chalmers, New Zealand, in the *Terra Nova*, with the intention of taking up the exploration of the interior of the Antarctic Continent, where his former expedition and that of Shackleton left off. In March, 1912, the *Terra Nova* returned to New Zealand and reported that the expedition had reached a point 150 miles from the Pole, and would remain in the Antarctic another winter. In February, 1910, a second Charcot expedition returned from exploring and mapping the shores of the Antarctic. During 1911, three new expeditions started for the Antarctic; a German expedition under Lieut. Wilhelm Filchner; an unsuccessful Japanese expedition; and an Australian expedition under Dr. Douglas Mawson, geologist of the Shackleton expedition. Early in the year it became known that Capt. Amundsen, who had started from Norway for the Arctic, had changed his plans for a dash to the South Pole. Amundsen spent the winter of 1911 on the ice barrier at Bay of Whales, Ross Sea. Leaving his camp, October 20, 1911, he reached the Pole December 14, after covering a distance of over 750 miles. Capt. Scott reached the Pole January 18, 1912, but perished with four companions on his return journey, March 29, 1912.

Polar Seas. See ANTARCTIC OCEAN; ARCTIC OCEAN.

Pol'der, technical term in Holland for a once submerged area of land surrounded by dikes and reclaimed by artificial drainage, in the great polders by powerful pumping engines moved by steam. Their surface is usually depressed below the surrounding country, and the lowest are below the sea level.

Pole, Reginald, 1500-58; English prelate; b. Staffordshire; son of Sir Richard Pole, Lord Montacute; cousin of Henry VIII; became Dean of Exeter at eighteen; opposed the king's project to divorce Queen Catharine, and left the kingdom, to reside at Avignon, Padua, and Venice; was summoned to return; refused; was deprived of his preferments and attainted. In the same year he was created a cardinal at Rome. He was legate at Viterbo, 1539-42; presided as papal legate at the opening of the Council of Trent, December 13, 1545; was a prominent candidate for the papacy in the election of 1549; appointed legate to England on the accession of Queen Mary; consecrated Archbishop of Canterbury, 1556; elected Chancellor of Oxford and Cambridge universities, 1556; author of "Liber de Concilio," "De Summo Pontifice Christi in Terræ Vicario," and "A Treatise of Justification."

Pole-ax. See BATTLE-AX.

Pole-cat, name often, in the U. S., applied to the skunk, *Mephitis mephitica*, but properly belonging to one of the weasels—*Putorius fœtidus*—a European species (also called fitch), about 16 in. long. The ferret is a semi-domesticated variety of this species.

Polem'ics, branch of the department of dogmatics especially concerned with ecclesiastical controversy, particularly of an aggressive character. It recognizes and emphasizes confessional differences and maintains the distinctive denominational tenets. Irenics, or the harmonizing of differences, is the end to be sought by polemics. The formation of religious and philanthropic societies by members of different denominations, the bringing of the Old Catholic, the orthodox Oriental, and the Anglican churches together, in conferences and such gatherings as the World's Parliament of Religions in Chicago, 1893, are signs that polemics is yielding to irenics.

Polemonia'ceæ. See PHLOX.

Polian'thes Tubero'sa. See TUBEROSE.

Police', the means instituted by the government to maintain public order, liberty, property, and individual or personal security. In the accomplishment of this function it is sometimes the auxiliary of the administrative department, sometimes of the judicial department. The need of discipline, of centralized power, has imparted to the police in every large city a semimilitary organization. Everywhere the same general system is to be found. The people are represented by the police commission, which appoints men to serve on the force, makes the rules which are to govern them, sometimes fixes salaries, etc. It is in the commission, when there is more than one member, that all debate on police matters takes place, and it is here that debate ends. Immediately after the commission, and subject to the rules made by it, comes the police force. A marked difference is seen at once, because membership in this is always for life or good behavior, and there is always a pension for those worn out in the service. In some cases the administration of the rules made by the commission is

carried on by the officials of the force without interference.

At the head of the force is an official known by various titles in the different localities, but often called superintendent. It is his business to see the orders of the commission carried out, to see that the members of the force, each in his degree, perform the multifarious duties exacted of them. He is the executive head of the force, and while he may, if he sees fit, consult with the higher officers on matters of moment, he issues orders to the force which all must obey. He is, from his position, not only the central authority, but the very mainspring of the force. In practice it has been found that the more uncontrolled the authority of this officer, the better the force; the more it is interfered with, the more disorganized and inefficient the force becomes. In some organizations of police, all promotions rest on the recommendation of the official who is the immediate superior of the person to be promoted and on the approval of the superintendent. This system has given the best results among the members of the force. No other has so completely secured promotion for merit, simply because all other systems have introduced causes for promotion which are not connected with the direct efficiency of the force. Immediately under the superintendent there are officials called inspectors in the U. S. Each inspector has assigned to him certain precincts over which he has executive control. As the superintendent carries out the orders of the commission, so the inspectors carry out the orders of the superintendent, and see that they are obeyed.

With reference to the population, a city is divided into sections called precincts, or in some countries, districts, and at the head of each is a captain of police. He rules the men attached to his precinct or station house—a building fitted up for the police and containing cells for prisoners—sees that the laws are obeyed, and the rules of the force carried out. Below the captains in rank come the sergeants, or in some cities lieutenants and then sergeants. One of these is on duty in the precinct house day and night. In many respects his duties are those of the captain. He is, however, more in contact with the people. He has many decisions to make, and must have a fair knowledge of the simpler rules of criminal law. The "roundsmen" are the officers to whom is intrusted the inspection of the patrolmen. It is their duty to see that the latter are walking their posts, that they do not break any of the rules made for them, and that they are at all times carefully watching for the welfare of the people.

There is a separate branch of the force which contributes in no small degree to the suppression and punishment of criminals. This is the detective bureau. It consists of a number of men who have been selected for their shrewdness, courage, and common sense, and for their acquaintance with the faces and careers of criminals. It is the special duty of the detectives to investigate crime, but a far more important part of their work is the prevention of crime by a ceaseless watch kept on the dangerous elements of society. Under their scrutiny come the anarchist and the pickpocket, the burglar and the confidence operator, and though the greater part of their work is never known to the public, they are a powerful agency in the maintenance of order in the community. In many countries there is a branch of the police which is practically unknown in the U. S. These are the political detectives, the men who watch those who are or who are supposed to be inimical to the existing government. During the Civil War, and for a short time afterwards, the members of the secret service of the U. S. Govt. did work of this kind, but since then the only avowed enemies of the Government in the U. S., the anarchists, are looked after by the local police.

In London the commission consists of a chief commissioner and two assistants, who are appointed for life by the king on the recommendation of the Home Secretary. The metropolitan district of Dublin has its own police, created under parliamentary act of 1836. The Scotch police were organized under parliamentary acts of 1857 and 1862, auxiliary to and amendatory of acts passed during the early part of the nineteenth century. The force is subdivided into county districts, the authority governing each county force being vested in a commission consisting of seven county chancellors, and the sheriff of the county being an ex officio member of the commission. In Paris the organization of the police is distinctly military. Under the Minister of the Interior, who is in the cabinet, there is the prefect of police and his subordinate, the director of public safety. The prefect occupies almost a cabinet position, in that he is expected to resign if the force fail in any great emergency. In Berlin the police are divided into the county police, the industrial, the building, the criminal, the public safety, the stranger, and the community police. The fire department is also a part of the same general bureau. The Minister of the Interior is the head of the police force, and the system is purely military. Under him is the general with a staff of twelve brigade generals who rank as colonels in the army, forty-nine district officers who rank as majors or captains, and so on. The men carry swords and firearms.

In Russia the police form the executive administrators of the whole empire, and their number is not published. In St. Petersburg there are about 10,000 police—officials of the public safety—who maintain order. They are not armed in any way, but carry whistles. The number of those employed as detectives in the famous "Third Section" is unknown. It is the duty of these men to keep a constant watch on everybody, especially foreigners in the country, and to make their reports to the head of the section personally. For many years this was the Minister of the Interior, but of late it has been some man, generally selected from the army, who has been especially appointed. The police in cities in Spain, Belgium, and Italy are organized under the military system so generally approved of on the Continent. In Turkey the police are more

like watchmen who look out for fires than guardians of the peace.

Police organizations of a military character are maintained in several portions of the British Empire. In Ireland the Royal Irish Constabulary, organized in 1836, have done good service, and it is this force which put into effect the various coercion acts passed by Parliament. In Canada a system of mounted police was formed on the model of the Royal Irish Constabulary, and in the Northwest Territories have managed the Indians and maintained laws with thoroughness. In Australia and Africa similar organizations have been started, and the police branch of the E. Indian Govt. is much like them. The organization is purely military in form; there is generally a lieutenant colonel or major at the head, responsible to the Minister of the Interior or the official who answers to him. Under the commanding officer there are captains, lieutenants, sergeants, and privates. These bodies of men have done splendid service and have kept the peace over large territories at a minimum of cost. In Australia the police have ruled the gold fields and the blacks, and in S. Africa a similar force has (1894) been organized to maintain order among the miners in the gold regions and to hold in check the Matabeles and other tribes. In India the force is recruited from the natives, but the officers are British. There is life tenure of position and a pension for old age or disability. With the mixed population of India, governed by an alien race, the supervision exercised by the police is of enormous value.

Pol'icy, name applied to various forms of lottery. In one form the "policy shops" give out each afternoon slips containing two columns of twelve numbers each, and each evening slips containing two columns of thirteen each. The numbers in each column are drawn by lot from those between 1 and 78 inclusive. Before the drawing a person may make bets in various ways; in a "straight gig" the player selects three numbers and receives odds of 100 to 1 for the afternoon slips, or 87½ to 1 for the evening slips, that they will not all three appear in the same column of the slip. In this the real chances against the player are nearly 173 to 1 for the afternoon, and exactly 133 to 1 for the evening, even when the drawing is fairly conducted. Policy playing is much in vogue among certain classes, in spite of laws against it.

Polit'ical Econ'omy is that branch of social science which treats of the development and application of material wealth for the well-being of men in society. Its main subject is wealth, which is the collective name for all useful things which can be owned and exchanged. The original source of all wealth is the bounty of God in nature. The secondary source of wealth is man's labor, exerted to bring forth the bounty of nature in form and time and place adapted to meet the wants of men. In the unfolding of this science four distinct lines of inquiry are to be followed. The first question is, how things intended to satisfy men's wants may be most economically produced. The second is, What rules can be laid down for their economical consumption? The third is, how the proceeds of industry in production may be equitably distributed to the different parties concerned in the process. And the fourth is, What are the processes involved in the exchange of these objects of wealth, one for another, all over the world? So the leading divisions of the science are Production, Consumption, Distribution, and Exchange.

Production.—Wealth is produced by the application of human labor to things existing in nature. But the laborer must have fit instruments, and must be supported by provisions already laid up. These are the fruits of previous labor, embraced under the comprehensive term capital. Under Production must be considered, therefore, (*a*) labor, (*b*) capital, (*c*) the coöperative union of labor and capital. Under labor are included both physical and mental labor. The effectiveness of labor is increased by the employment of nature's forces and by a systematic division of labor. To secure these helps, capital is all-essential. Capital is the result of saving—*i.e.*, simply laying up a surplus of wealth produced above wealth consumed. It represents former labor, and in the process of production it is embodied in three forms, *viz.*: the materials to which labor is applied, the instruments of labor, and the means for the support of the laborers. The union of labor and capital is natural and necessary. In it past labor, the fruit of saving, simply joins hands with present labor, vital and active. They meet to best advantage in the same person—*i.e.*, when the laborer is owner of capital enough to employ his labor. Sound political economy favors the making of every laborer to some extent a capitalist, and every capitalist in some way a laborer.

Consumption may be regarded as either private or public, the former embracing all destruction of wealth for personal necessities and gratifications, the latter that which is directed by public authority for the general good. There are two simple rules of economy for both private and public consumption: (1) Let the destruction of value in any case be as small as possible to secure a given result; (2) from a given expenditure get the largest result possible.

Distribution.—In any branch of industry, and in the general productive industry of a nation, three parties are to be recognized, *viz.*: the government, which gives security to property; the owners of the capital employed, and the laborers. The gross annual production must accordingly be distributed for four distinct purposes: (1) For the support of government through taxes paid; (2) for replacing the capital actually destroyed in materials used up, in provisions consumed, and in machinery worn and decayed; (3) to give capital its due reward in the form of rent, interest, or dividends; (4) to give labor its due reward in wages, salaries, commissions, or fees. These four items are to be reckoned in the aggregate of expenses of production. But the result of productive industry should show a surplus beyond these in the form of profits. The most difficult question of distribution respects the

disposal of these. Strict justice would divide the profits in some fair proportion between the capitalists and the laborers, including the managers, with due regard to the difference of capacity, responsibility, and risk pertaining to the respective parties. The interposition of government is needed only to guard the rights of all.

Exchange.—The diversity of nature's gifts, the wide reach of men's desires, and the principle of division of labor necessitate exchange. This part of the machinery of society gives rise to the most difficult problems of our common life. The simplest form of exchange is barter —*i.e.*, the giving of service for service, commodity for commodity, or service for commodity, and commodity for service. Value is the central term in this branch of the subject. The inconveniences of barter necessitate the introduction of some instrument which shall serve as a universal measure of values and as a medium of exchange. This instrument, whatever form it takes, is money. Credit also, in the machinery of exchange, renders a service no less important than that of money. As an intermediate agency it actually effects far the greater part of the exchanges of the world with great saving of money, time, labor, and risk, virtually resolving trade to a great extent into barter.

History.—Under the ancient civilizations of Egypt, India, Greece, and Rome we find evidence of careful observation of the facts of economic science and the occasional defining of sound principles. But no systematic arrangement of either facts or principles was attempted. Aristotle in one of his works first employs the term "political economy," though in a vague way, and propounds some good doctrines which have stood the test of time. Feudalism gave birth to the protective system and to manifold grievous monopolies. In the sixteenth century the industrial and commercial activity of the Italian cities prompted a broader and more philosophical investigation of the sources of public prosperity, and with the Italian writers of that and the following centuries systematic political economy had its origin. Its development was aided by Spanish and French writers and by the financial reforms instituted by Sully and Colbert, the ministers of Henry IV and Louis XIV. In 1776 Adam Smith published his "Wealth of Nations," which may be said to be the beginning and source of modern political economy. Since his day, amid much conflict of opinions, fundamental principles have been settled, and the tendency has been to recognize more and more the golden rule of Christ as applicable alike to states, communities, and individuals, in their economic as in all other social relations.

Political Part'ies, free social organizations to accomplish certain political results. In Great Britain the four principal parties are the Conservatives, Liberals, Liberal-Unionists, and Nationalists. Of these, the first two can be traced back to the earliest party of progress and the party that clung to the established order. In the reign of Charles II the terms Petitioners and Abhorrers were employed to designate, respectively, those who favored the petition for the summoning of a Parliament hostile to the succession of the Duke of York and those who, in their hatred of the Exclusion Bill, declared their "abhorrence" of the attempt to induce the king to call Parliament. These terms soon gave way to Whigs and Tories, as the enemies and friends of the royal prerogative were, respectively, called; till, in the nineteenth century, the terms Liberals and Conservatives came into use.

In France definitive party issues and party names made their appearance during the era of the revolution. Radical and moderate opposition to the old régime were the respective characteristics of the Jacobins and Girondists during this period, while the Feuillants tried to maintain the Bourbon monarchy, but with constitutional limitations. After the restoration of the Bourbons there were, in addition to the Constitutional Monarchists who supported Louis XVIII, the Ultra-Royalists, or adherents of the Count of Artois, afterwards Charles X; the Bonapartists, the Doctrinaires, and the Republicans. Louis Philippe encountered an opposition from Bonapartists, Republicans, and Legitimists. The first of these triumphed with the elevation of Napoleon III, 1852, and the second, the Republicans, with the establishment of the republic, 1871. The Royalist party is no longer a dangerous element. The only division now is between the government Republicans and the opposition, which includes Radicals, Progressist and Radical Republicans, Socialist Radicals, Unified Socialists, Independent Socialists, Royalists, Bonapartists, and Nationalists. The reactionary elements of the opposition sit together in the Chamber, and are known as the Right

In the German Empire, the leading parliamentary groups in the Reichstag after the formation of the empire were the National Liberals, who, though not in sympathy with Bismarck's general policy, supported his efforts for unification and reform; the remnant of the Progressists (*Fortschrittspartei*), who opposed all compromise with Bismarck; the Old Conservatives, hostile even to the measure of reform that Bismarck was willing to concede; and the Free Conservatives (*Reichspartei*), who were his thoroughgoing supporters. To these were added the Ultramontane party, or Center, composed of Roman Catholics who opposed the government policy during the Kulturkampf; the Social Democrats, with a socialistic programme, the Jewish members, and the protesting delegates from Alsace-Lorraine. After the election of 1903 the principal parties in that body, in the order of numerical strength, were the Center, called also the Ultramontane, or Clerical party; Social Democrats, Conservatives, National Liberals, Radical Left, and Poles.

Italian political parties formerly consisted of a Right (Monarchical and Conservative) and a Left (Liberal and Democratic, if not Republican), the former being the party of Cavour, the latter of Mazzini. These parties have since been much divided. The prominent parties to-day are the Constitutional Liberals, Constitutional Opposition, and the Radicals,

Republicans, and Socialists, who form the Extreme Left. In Austria, racial and religious differences constitute the chief political issues. Thus the party of the Young Czechs desire national emancipation, to which the Germans, the most numerous element, are opposed. In Hungary parties are distinguished as Liberals, Independents, the Croatian delegates (who usually vote with the Liberals), and the Nationalists. In Belgium the leading parties are the Catholics, or Clericals; the Liberals, and the Socialists. In the Danish Reichstag the Right, or Conservatives, hold that the lower house, or Folkething, has not the supremacy in matters of taxation and finance and in the choice of the ministers, while the Left contend that these rights are vested in that body. In this country also the Socialists have become prominent as a party. In the Spanish Cortes there are, in addition to the usual division into Liberals and Conservatives, the Extreme Republicans, the Moderate Republicans, or Possibilists, and the Carlists.

The principal political parties in the U. S. are discussed in the articles on the respective parties and groups.

Pol'ity, Ecclesias'tical, form, system, and method of Church government. The three plans of government are: (1) The *Presbyterian*, or by presbyters, or elders, also styled bishops, all the clergy being on a level, these officers coming directly from the synagogue, and historically from the earliest constitution of the Hebrew people. (2) The *Congregational*, according to which each congregation regulates its affairs and settles its belief independent of control by other congregations, although such are called in for consultative purposes and joint action. (3) The *Episcopalian*, or government by bishops, who constitute an order superior to the presbyters and deacons. The Church of England is episcopal in government; claims apostolic succession; is governed by two archbishops—Canterbury and York—under the supremacy of the sovereign. The Church in the U. S., as the Protestant Episcopal denomination prefers to be called, and the branches of the Church of England are also episcopal. The bishops of the Swedish and Danish Lutheran churches, of the Moravian, Methodist Episcopal, United Brethren in Christ, Evangelical Association, and other denominations are properly superintendents, and no divine right is predicated of them. The Presbyterian plan is adopted by reformed bodies, which do not call themselves Presbyterian. It is usually linked with Calvinistic theology. The Congregational plan, in like manner, is adopted by those who are not styled Congregationalists, as the Baptist, Disciples, Unitarian, and Universalist bodies.

Polk, James Knox, 1795–1849; eleventh President of the U. S.; b. Mecklenburg Co., N. C.; removed with his father to Tennessee, 1806; graduated at Univ. of North Carolina, 1818; admitted to the bar, 1820; 1823, elected to the state legislature; member of Congress, 1825–39; speaker, 1835–39. In 1839 he was elected Governor of Tennessee; 1840, was nominated by the legislatures of Tennessee and several other states for Vice President, with Mr. Van Buren, but received only one electoral vote, Richard M. Johnson, of Kentucky, being the regular Democratic candidate. In 1844 Mr. Polk was elected as the Democratic candidate for President, with George M. Dallas as Vice President, receiving 170 electoral votes, while 105 were cast for Clay and Frelinghuysen. The chief events of his administration were the Mexican War, 1846–47; adjustment of the Oregon boundary on the parallel of 49°, instead of 54° 40′, originally claimed; adoption of the low tariff of 1846, replacing the protective one of 1842; establishment of the independent treasury system, by which the revenues were collected in specie without the aid of banks; creation of the Department of the Interior; and admission of Wisconsin into the Union.

Polk, Leonidas, 1806–64; American prelate; b. Raleigh, N. C.; graduated at West Point, and entered the artillery, 1827; resigned same year; ordained in the Protestant Episcopal Church, 1831; missionary bishop of Arkansas and Indian Territory S. of 36° 30′, with provisional charge of the diocese of Alabama, Mississippi, and Louisiana, and missions in the republic of Texas, 1838–41; Bishop of Louisiana, 1841–61. In 1861 he was appointed major general in the Confederate army; placed in command of the districts along the Mississippi, from the mouth of the Arkansas to Paducah on the Ohio; Fort Donelson and Fort Henry were constructed under his direction; later commanded a division in the West; at Murfreesboro, Chattanooga, Chickamauga, and in the Georgia campaign of 1864 commanded a corps as lieutenant general; killed by cannon shot at Pine Mountain, Ga.

Polka (pōl'kä), supposed to be derived from Bohemian pulka, half; dance first known in E. Bohemia; introduced, 1835, at Prague and, 1840, at Paris, and since generally adopted. It is danced by two persons, advancing together, or whirling as in the waltz, with high steps and stamping action.

Pol'lack, or Pollock. See COALFISH.

Pollajuolo (pōl-lä-yō-ō'lō), **Antonio,** 1429–98; Italian painter and sculptor; b. Florence; chief painting "The Martyrdom of St. Sebastian"; chief sculpture, monument to Pope Sixtus IV, Rome; said to have been the first artist who dissected the dead body for art instruction, and one of the first Florentine artists who used the oil medium.

Pollajuolo, Pietro, 1443–96; Italian painter and sculptor; b. Florence; brother of preceding, with whom he worked on both paintings and sculptures; independently designed the Belvedere Palace for Innocent VIII; noted also as medalist and engraver.

Pol'lio, Caius Asinius, 76 B.C.–4 A.D.; Roman general; in the civil war joined Cæsar, and was with him at the passage of the Rubicon and the later march through Italy. He was at battle of Pharsalia, 48, and on his return to Rome was elected tribune of the people. In 46 and 45 accompanied Cæsar in his African

and Spanish campaigns; later commanded in Further Spain against Sextus Pompey; was consul, 40; assigned to the province of Transpadane Gaul. In 39 he made a successful campaign in Illyria, and received a triumph. He wrote a history of the civil war, seventeen books, and some tragedies, none of which are extant, and established the first public library in Rome.

Pol'lock, Sir Frederick, 1845– ; English jurist; called to the bar, 1871; several times examiner in law at Cambridge and other universities; Prof. of Jurisprudence at University College, London, 1882–83; of Law in the Inns of Court, 1884–90; Corpus Prof. of Jurisprudence at Oxford, 1883–1903; lecturer in Univ. of Calcutta, 1893–94; editor of *The Law Quarterly Review* after 1885, and of the law reports after 1895; leader in the modern school of historical and analytical law writers.

Pollock. See COALFISH.

Pol'lux, Julius, Greek scholar; b. Naucratis, Egypt, abt. 130 A.D.; lived in Athens as teacher of rhetoric and philosophy; his "Onomasticon" is a kind of dictionary in which the principal words relating to certain subjects are collected into groups, defined, and illustrated by quotations. The work is of manifold interest to the student of the Greek language, literature, and art.

Pollux. See CASTOR AND POLLUX.

Po'lo, Marco, abt. 1254–1324; Venetian traveler; he set out for the East, 1271, with his father Nicolo and his uncle Maffeo, who had recently returned from a nineteen-years' absence in Asia as traders. They passed through Palestine, N. Persia, and Tartary, and, 1275, reached the capital of Cathay (China). Kublai Khan appointed Marco to various important offices, and he visited many parts of China and the neighboring regions. On their return they accompanied a Persian embassy by sea, touching at Borneo, Sumatra, the Nicobar and Andaman islands, Ceylon, and the Carnatic, and landing in the Persian Gulf, 1292. They then went through Kurdistan and Mingrelia to Trebizond on the Black Sea, and taking ship arrived at Venice, 1295. They found difficulty in persuading their friends of their identity, and their stories were not believed. Even on his deathbed Marco was urged to retract his alleged falsehoods; but he solemnly reaffirmed all his statements, and there is now no doubt that he spoke substantially the truth. He was the first to make known to Europeans the existence of Japan. Maffeo became one of the principal magistrates of Venice. Marco was put in command of a galley in the fleet sent against the Genoese, off the coast of Dalmatia, and was wounded in the ensuing engagement and carried prisoner to Genoa. During his four or five years' captivity he dictated to a fellow prisoner the account of his travels, finished, 1298. It was probably written and first published in French, and translated into Latin during Marco's lifetime.

Polo, game of ball played on horseback; originated among British officers in India; introduced into the U. S., 1876. Ponies are used, whose height is limited to fourteen hands; the "mallets" must be 4 ft. 4 in. long. It is played by sides, and the object is to drive the ball from the center of the ground through either of the goals, the side gaining the most goals being the winner. It is similar to "hockey," except that hockey is played on foot. WATER POLO is a game played by swimmers. Sides are chosen, and the attempt made while swimming to force a football through the opponents' goal. This game has generally been confined to baths in gymnasiums.

Polo'nium, metallic radioactive element found in pitchblende, 1898, by Prof. Pierre Curie (1859–1906) and wife, of Paris, discoverers also of radium. It is difficult to extract, as pitchblende contains many other minerals. Polonium, unlike radium, loses its radioactivity slowly. It has been regarded as a radioactive form of bismuth and not a distinct element.

Polta'va, or Pultowa, capital of government of Poltava, Russia; on the Vorskla, tributary of the Dnieper; 88 m. SW. of Kharkoff; has manufactures of tobacco and leather and four annual fairs, at which horses, cattle, leather, wool, hides, etc., are sold to the value of about $12,000,000 annually. June 27, 1709, Peter the Great won here a decisive victory over Charles XII, in commemoration of which a large monument has been raised in the principal square. Pop. (1897) 53,703.

Polyan'dry, marriage of one woman to several husbands at the same time; the antithesis of polygamy, the marriage of one man to several wives; has been practiced by many peoples from ancient Greece down, and now exists in many parts of the globe. Spencer in his "Sociology" considers the custom in four phases: (1) One wife with several unrelated husbands, and each of the husbands with other unrelated wives; (2) unrelated husbands with but one wife; (3) husbands that are related; (4) husbands that are brothers. See POLYGAMY.

Polyan'thus. See PRIMROSE.

Polyb'ius, abt. 204–122 B.C.; Greek historian; b. Megalopolis, Arcadia; son of Lycortas, who succeeded Philopœmen as head of the Achæan League. After the defeat of Perseus of Macedon at Pydna, 168, 1,000 Achæans, among whom was Polybius, were carried to Italy to be tried for not having aided the Romans. Through the influence of Fabius and Scipio, sons of Æmilus Paulus, Polybius was permitted to dwell in their father's house at Rome, and a strong friendship sprang up between the historian and Scipio. After seventeen years' exile, he accompanied the survivors home. He joined Scipio in the third Punic War, and was present at the destruction of Carthage, hastened to the Peloponnesus after the reduction of Corinth, and did much to mitigate the severity of the victors. His great work is his history, in forty books, giving an account of the growth of the Roman power from 220 B.C., where the histories of Timæus and Aratus of Sicyon left off, to 146, the year

of the destruction of Carthage and Corinth. Only five books remain entire, but fragments of the rest are extant.

Pol'ycarp, Saint, abt. 70–156 A.D.; one of the early Christian Fathers; b. probably Smyrna; became a disciple of St. John the Evangelist, who consecrated him Bishop of Smyrna. During the controversy about the celebration of Easter he went to consult Anicetus, Bishop of Rome, against whom he defended the practice of the Eastern Church; and he distinguished himself while at Rome by his opposition to the Marcian and Valentinian heresies. During the persecution under Marcus Aurelius he was burned at the stake in Smyrna. Polycarp wrote several homilies and epistles, all of which are now lost except a short epistle to the Philippians. Day, January 26th.

Pol'ychromy, application of varied and generally bright colors to buildings, statuary, and other objects; also the study or theory of this art. Most ancient peoples decorated their buildings inside and out with painting in vivid colors. When this was not done it was because the materials of the building or of its facing were naturally varied in color: Thus the frieze of the Erechtheion at Athens was in black marble, with white-marbled figures in relief on it, and the interiors of Roman temples, basilicas, and palaces were lined with variegated natural marbles. Oriental nations, both those of the Far East and the Mohammedan peoples of the Levant, show skill in polychromy. The differences between these nations in their use of color in this way are considerable. Thus the Japanese excel in the combination of browns and grays, gold of different tints, bronze, and other alloys, and generally in all the effects of subdued and delicate color, while the Chinese surpass all other peoples of modern times in handling dark and light blue, pure green, vivid yellow, orange, and white.

Polycle'tus, Greek sculptor; flourished abt. 430 B.C.; said to have been a pupil of the Argive Ageladas, in whose school Phidias and Myron were his fellow students; was judged to have surpassed Phidias in images of men, though not in those of the gods. His "Spear Bearer" was so exquisitely proportioned that it was called the canon or rule. Polycletus wrote a treatise on the proportions of the human form. He was considered the greatest architect of his time.

Polyc'rates, d. 522 B.C.; Tyrant of Samos; seized sovereignty of Samos, and made war with unvarying success on the neighboring territories; furnished forty galleys to Cambyses for the invasion of Egypt, manning them with his personal enemies. They deserted, returned to Samos, and attacked Polycrates, but were defeated. Afterwards Orœtes, the satrap of Sardis, lured him into Magnesia, where he was crucified.

Polyde'monism. See ANIMISM.

Polyg'amy, state of a man having two or more wives at the same time. The state of a woman having two or more husbands at the same time is called polyandry. In ancient times polygamy was practiced by all the E. nations, and was sanctioned, or tolerated, by their religions. In the Homeric age it seems to have existed to some extent among the Greeks, but during the latter development of Greek civilization it disappeared. To the Romans and the Gotho-Germanic races it was unknown. With the Jews it was common among the patriarchs and tolerated by the law of Moses, but toward the beginning of our era the custom seems to have died out. The Koran sanctions it, but among the Arabs it does not prevail as a rule. Among Christians, although the New Testament contains no positive injunction against it, it was never tolerated, except among the Mormons. In modern times polygamy is common only among the savage African and Malayo-Polynesian races and among the degraded nations of Asia. See POLYANDRY.

Pol'yglot, book with versions of its texts in several languages, but generally used only of such editions of the Bible. Of Origen's "Biblia Hexapla" only a few fragments are extant. The first great polyglot printed was the "Complutensian" (printed under the care and at the cost of Cardinal Ximenes at Alcalá de Henares, Spain), six volumes, folio, 1520; it was followed by the Antwerp, eight volumes, folio, 1569–72; the Parisian, ten volumes, folio, 1628–45, and, greatest of all, the London, six volumes, folio, 1654–57.

Pol'ygon, plane figure bounded on all sides by straight lines. The bounding lines are called *sides* of the polygon, and the points at which they meet are called *vertices* of the polygon; the entire boundary line is called the *perimeter.* Polygons are divided into classes according to the number of their sides or angles. Polygons of three sides are called *triangles*; those of four sides are *quadrilaterals*; those of five sides, *pentagons*; those of six sides, *hexagons*; and so on. If the sides of a polygon are equal, the polygon is said to be *equilateral*; if its angles are equal, it is called *equiangular.* A *regular* polygon is both equilateral and equiangular. A closed broken line, all of whose sides are not in a single plane, is often called a *twisted polygon.*

Polyhe'dral An'gle, solid angle formed by three or more planes passing through a common point. If there are but three planes, the angle is called *trihedral.* The intersections of the bounding planes are called *edges* of the polyhedral angle, and their common point is called the *vertex* of an angle. If a sphere be described about the vertex as a center with a radius equal to 1, the part of its surface included within the bounding planes is taken as the measure of the angle.

Polyhe'dron, solid bounded on all sides by polygons. The polygons are called *faces,* and the lines in which they meet are called *edges* of the polyhedron. The points in which two or more edges meet are called *vertices* of the polyhedron. The simplest polyhedron is bounded by four triangles, and is the pyramid known as a tetrahedron.

Polyhym'nia, one of the Muses; inventor of the lyre and the genius of lyric poetry; generally represented by ancient artists in a pensive attitude.

Polymor'phism, in biology, that condition in which different kinds of individuals appear in the same species. In the animal kingdom it has its greatest exemplification in the group of *Siphonophoræ,* where the whole colony is made up of members, all reducible to a common type, which are specialized for the functions of floating, swimming, reproduction, eating, and touch.

Polyne'sia, geographical designation generally used for that part of Oceanica which lies S. of the equator and E. of the 170th meridian of E. lon.—a division based on ethnographic grounds.

Polyni'ces, in Grecian mythology, the firstborn son of Œdipus, by his own mother, Jocasta; was banished from Thebes by his younger brother, Eteocles, and fled to Argos, where he married Argeia, daughter of Adrastus, the King of Argos. Adrastus undertook to reinstate Polynices, but the seer Amphiaraus knew that the expedition was doomed to failure, and he urged Adrastus not to undertake it. Polynices gave the necklace of Harmonia to Eriphyle, and she persuaded her husband to sanction the expedition, which meant death to himself. All the chieftains except Adrastus were slain at Thebes, Polynices falling at the hands of Eteocles, whom he slew.

Pol'yp, one of the individuals of any of the fixed cœlenterata, and in earlier times of the *Polyzoa* and Tunicates.

Polyphe'mus, in Grecian mythology, the famous Cyclops, son of Poseidon; a monster with one eye in the center of the forehead; lived in the island of Thrinacia, where he captured Odysseus on his return from Troy. Odysseus escaped by making Polyphemus drunk and burning out his eye. See GALATEA.

Polyph'ony, in music, composition in several parts, vocal or instrumental, each part having an independent melodic flow of its own, but all uniting to express one musical thought or idea. This is contrast to *homophony,* so called, which is a simple succession of chords supporting a given melody, but without independent progression among the various accompanying parts or voices themselves.

Pol'ypod, popular name given to many ferns, but properly belonging to those of the genus *Polypodium,* of which the U. S. has eleven species, growing on rocks, tree trunks, etc.

Pol'ytheism, the distribution of the perfections and functions of the infinite God among many limited gods. It sprang out of that nature worship seen in the earliest Hindu Vedas, so soon and so generally supplanting primitive monotheism. At first, as it long remained in Chaldea and Arabia, it consisted in the worship of the elements, especially of the stars and of fire. Subsequently it took special forms from the traditions, the genius, and the relative civilization of each nationality. Among the rudest savages it sank to fetishism, as in W. and central Africa. Among the Greeks it was the apotheosis of heroic men rather than the revelation of incarnate gods. In India, springing from a pantheistic philosophy, it has been carried to the most extravagant extreme, both in respect to the number and the character of its deities. See DEISTS; PANTHEISM; THEISTS.

Polyx'ena, daughter of Priam and Hecuba, beloved by Achilles. One legend relates that she was sacrificed to the manes of Achilles; another, that when he was slain she killed herself upon his tomb.

Polyzo'a, name given to the lowest of the molluscoids, popularly known as sea mosses and sea mats, and also known as BRYOZOA. They form colonies, protected usually by a horny integument. They look much like hydroids, but the separate cells of the colony are merely connected externally, without direct communication with each other. Most of the polyzoa are fixed and plantlike; but the fresh-water colony creeps about on a base flattened like the foot of a slug. In the fresh-water forms the crown of tentacles generally assumes the horseshoe shape, while in the marine it is circular.

Pombal (pän-bäl'), **Sebastião José de Carvalho e Mello** (Marquis de), 1699–1782; Portuguese statesman; b. near Coimbra; was envoy to London, 1739–45; and later to Vienna, where he mediated between Austria and the pope. He married the Countess Daun, whose influence secured him, 1750, the Portuguese Ministry of Foreign Affairs. He carried out great reforms, and evinced much devotion to the public good during and after the earthquake of Lisbon, 1755, the city being rebuilt under his direction; 1756 became Prime Minister. In 1758 he ordered the execution of the Duke of Aveiro and other important persons implicated in a conspiracy against the king's life. One of his most important acts was the expulsion of the Jesuits, 1759. The Portuguese still call him "the great marquis." On the death of King Joseph, 1777, his adversaries among the partisans of the Jesuits and the nobility caused his banishment from the court.

Pomegranate (pŭm'grăn-ăt), shrub, *Punica granatum* of the Old World (of the family *Granataceæ*), now naturalized in most warm countries; grows finely in those parts of the U. S. bordering the Gulf of Mexico; fruit, also called pomegranate, is of fine appearance. Some of the varieties are subacid and others sweet; most of them abound in small seeds, but some are seedless. The fruit is very grateful in hot climates; flowers very fine, and sometimes double; bark used in tanning; rind is a good astringent for medicinal use.

Pom'elo, or **Pumelo.** See SHADDOCK.

Pomera'nia (German, POMMERN), province of Prussia, bordering on the Baltic; area, 11,630 sq. m.; pop. (1905) 1,684,326; capital, Stettin; on the coast are the islands of Rügen, Usedom, and Wollin; largest river, the Oder. Pomerania is one of the most level regions of

Germany; is rich in agricultural products, cattle, and horses. The province was in the early part of the Middle Ages a principal portion of the old Wendish monarchy; governed chiefly by its own dukes, 1062–1637; frequently overrun by the Poles, and came into the possession of Sweden during the Thirty Years' War. Brandenburg obtained Further Pomerania (E. of the Oder) under an old claim, and at the Peace of Stockholm, 1720, Sweden gave up to Prussia the greater portion of Hither Pomerania, but continued to hold the district between Mecklenburg, the Baltic, and the river Peene, with the island of Rügen. This she ceded to Denmark for Norway; and, 1815, it was given up to Prussia for the duchy of Lauenburg and 2,600,000 thalers.

Pom'eroy, Seth, 1706–77; American military officer; b. Northampton, Mass.; major in the Massachusetts forces at the capture of Louisburg, 1745; lieutenant colonel of the regiment commanded by Col. Ephraim Williams, at whose death, in the battle of Lake George, September 8, 1755, he took command and gained a complete victory over Baron Dieskau. He was a delegate to the Massachusetts Provincial Congress, 1774–75, by which he was elected a general officer, 1774, and a brigadier general, 1775; fought at Bunker Hill as a private soldier; soon afterwards appointed senior brigadier by the Continental Congress, but declined the post.

Pomol'ogy, science of fruit culture; divided as concerns its application to the U. S., into *viticulture,* or grape growing; *orcharding* (divided into the cultivation of pomaceous fruits, or the pear and applelike tribes; drupaceous, or stone, fruits; citrous fruits, as oranges and lemons; nut fruits, nuciculture; and pulmaceous fruits), *small-fruit culture,* and *cranberry culture.* Pomological interests are greater in the U. S. than in any other country. See FRUITS; HORTICULTURE.

Pomo'na, Roman goddess of gardens and fruit, of whose wooing by Vertumnus, the god of the revolving year, Ovid made a pretty story. Her worship was presided over by a special priest, the flamen Pomonalis, and in the country between Ardea and Ostia there was a grove, called the Pomonal, sacred to her.

Pompadour (pŏn-pä-dôr'), **Jeanne Antoinette Poisson** (Marquise de), 1721–64; mistress of Louis XV of France; b. Paris; noted for dignity, beauty, intelligence, and wit; married, 1741, to Le Normant d'Étoiles; became mistress of Louis XV, 1745; presented at court, and splendidly established in the royal residences at Paris, Versailles, and Fontainebleau; received several magnificent estates and an annual income of 1,500,000 fr., and for nearly twenty years exercised a decided influence on the government of France in all its branches, bringing loss and disgrace over the kingdom. On the other hand, she deserves praise for her patronage of literary men and artists.

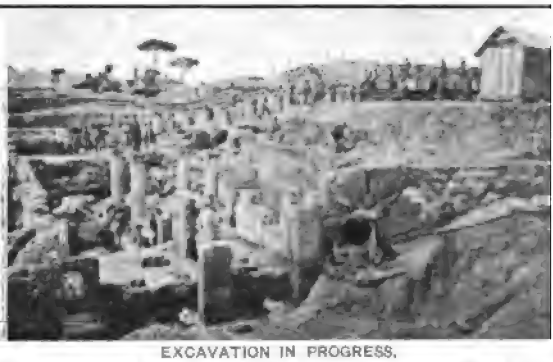
Pom'pano, name applied to several food fishes, particularly to *Trachynotus carolinus,* a species found in the Gulf of Mexico, and highly valued; attains a length of about 18 in. In California the name is given to a smaller fish of somewhat similar shape (*Stromateus simillimus*).

Pompeii (pŏm-pā'yē), ancient city of Italy, 12 m. SE. of Naples, at the foot of Mt. Vesuvius. It was overwhelmed by the eruption of August 24, 79, which involved it with Herculaneum and Stabiæ in a common destruction. For nearly seventeen centuries afterwards the city disappears from history. A village arose on the site, but was destroyed by the eruption of 472. In 1748 several statues and other objects of antiquity were exhumed in sinking a well. Charles III of Naples ordered extensive excavations, and, 1755, the amphitheater was uncovered. His successors have continued the work, until a large part of Pompeii has been brought to light. The city thus partially exhumed is of incalculable importance from the insight which it has afforded into the domestic economy, the arts, and the social life of the ancient world. Pompeii occupied within its walls, which have been traced throughout their whole extent, an irregular oval area about 2 m. in circumference. It has generally been supposed that the population was from 20,000 to 50,000; but, according to Fiorelli, Pompeii had no more than 2,000 inhabitants in its earlier days, and no more than 12,000 at the time of its destruction. Eight gates have been discovered, and the roads outside of them were lined on either side with tombs of considerable size and architectural pretension. The street of tombs before the gate of Herculaneum was the principal burial place of the city, and the sepulchral monuments adorning it give evidence of refined taste and great wealth. The streets for the most part run in regular lines. The widest does not exceed 30 ft. in breadth, and few are over 22 ft. The Forum, in the SW. corner, is the most spacious and imposing structure, and in its immediate vicinity are the chief temples, theaters, and other public buildings.

The architecture of Pompeii for the most part is mixed, the style, whether Greek or Roman, being frequently defective, and the attempts to unite different orders clumsy and tasteless. SE. of the forum were the great, or tragic, theater and the lesser theater, or Odeum. The former, having accommodations for about 5,000 people, stood on a slight elevation, and was never completely buried. In the SE. angle of the city was the amphitheater, an ellipse 430 ft. by 335, capable of seating 10,000 spectators; and immediately N. of the Forum were the *thermæ,* or public baths, in an elegantly adorned and well-arranged structure. The dwellings are for the most part small and low, few exceeding two stories, have little external ornamentation, and are well adapted to a people accustomed to pass most of the day in the open air. The ground fronts of many of the finest are occupied by shops. In many of the dwellings the daily life, habits, tastes, and even the thoughts of the occupants can be traced with almost positive certainty. Names have been applied to the houses of the better

PANORAMA OF THE EXCAVATIONS.

UP TO THE PRESENT TIME ABOUT THREE-FIFTHS OF POMPEII HAS BEEN EXCAVATED.



EXCAVATION IN PROGRESS.

SHOWING THE "ATRIUM" OF "THE HOUSE OF THE SILVER WEDDING," CLEARED IN 1892.

"THE HOUSE OF THE TRAGIC POET."

IN "THE LAST DAYS OF POMPEII" THIS IS REPRESENTED AS THE DWELLING OF GLAUCUS.

THE TEMPLE OF APOLLO.

AT THE LEFT OF THE STEPS IS THE COLUMN ON WHICH WAS THE SUNDIAL IN FRONT OF THE STEPS IS THE ALTAR.

THE VILLA OF DIOMEDES.

ONE OF THE MOST LUXURIOUS DWELLINGS IN THE CITY AND THE ONLY ONE POSSESSING A PORCH OR PORTICO.

THE BARRACKS OF THE GLADIATORS.

BUILT AT THE BACK OF THE THEATRE AND USED ALSO FOR A PRACTICE COURT.

THE STREET OF TOMBS.

ONLY A PART OF THIS HAS BEEN UNCOVERED.

THE FORUM, OR BUSINESS CENTRE.

INCLUDING THE COLONNADE THE FORUM MEASURES APPROXIMATELY 467 FT. BY 158 FT.

THE BURIED CITY OF POMPEII.

description, which are either those of the supposed possessor, or suggested by his occupation, or by prominent objects of art found in them. Several houses were evidently entered by their owners immediately after the subsidence of the first eruption, in search of valuables. The most important paintings and objects of art discovered by excavation have been deposited in the Museo Borbonico (now National Museum) in Naples. Since 1861 the government has liberally assisted the work of excavation, though the great care taken in unearthing the monuments has prevented rapid progress.

Pom'pey, Cneius Pompeius Magnus, 106–48 B.C.; Roman general; son of Cneius Pompeius Strabo, under whom he first served in the Social or Marsic War. During the struggle between Marius and Sulla he sided with the latter, and when Sulla, after finishing the Mithridatic War, took up his march for Italy, Pompey raised three legions, defeated the Marian general M. Brutus, and effected a junction with Sulla. During the war which prostrated the Marian party in Italy he gained great distinction as one of Sulla's legates. He next reduced Sicily, and, 81, overran Numidia, and crushed the Marian party there. On returning to Rome the dictator bestowed on him the surname of Magnus, and he was awarded a triumph. When Lepidus, 77, marched on Rome, he joined Catulus in defeating him. In 76 he was sent to coöperate with Metellus Pius in the reduction of Spain, brought the war to a successful termination, and, 71, returned to Rome. On the way he cut to pieces a body of 6,000 gladiators, and thus claimed the merit of finishing the Servile War also. In the following year Pompey and Crassus entered on the consulship, and the former instituted popular measures which involved the severance of his party ties, and thenceforth for many years he was the avowed enemy of the aristocracy. In 67 he annihilated the entire fleet of the pirates who infested the Mediterranean in a great battle off Coracesium, on the coast of Cilicia. In 66 he was invested with the command of the war against Mithridates, and, pushing forward with rapidity, surprised and totally defeated him in Lesser Armenia. During the next four years all E. Asia Minor was subjected to the Roman sway, and Armenia, the S. Caucasus, Mesopotamia, Syria, Phœnicia, and Judea were made tributaries or reduced to the condition of conquered provinces.

In 63 Mithridates put an end to his life, and Pompey left Asia, 62, and reached Rome at the end of a year, bringing with him immense spoils and many noble captives, who graced his third triumph. The Senate refused to ratify his measures in Asia without detailed examination. Pompey found a friend in Cæsar, and the two, with Crassus, formed the first triumvirate. In 59 Cæsar entered on his first consulship, secured for Pompey the ratification of his acts in Asia, and gave him his daughter Julia in marriage. In 55 Pompey and Crassus became consuls, and the former, to whom was assigned Spain, excited discontent by sending his legates thither to conduct the war instead of going himself. A state of anarchy having been produced mainly by his secret intrigues, he was made "consul without colleague," in reality dictator, 52; became the acknowledged head of the aristocracy; and began to devise measures to check the designs of Cæsar; but when Cæsar, 49, crossed the Rubicon and marched on Rome, Pompey found himself unable to offer resistance, and fled to Brundusium. Being vigorously followed, he crossed the Adriatic, and at Dyrrhachium assembled a numerous army. Early, 48, Cæsar, having conquered Pompey's legates in Spain, arrived in Epirus, received a severe check at Dyrrhachium, and marched into Thessaly. Pompey followed him to Pharsalia, where he was completely routed by Cæsar's veterans, and fled to Lesbos, whence he went to Pamphylia. Being advised to seek an asylum with the young King of Egypt, he arrived off the coast of that country and disembarked in a small boat. The chief officers of the king, who had determined to put him to death as a means of propitiating Cæsar, were awaiting him on the shore, and as he was about to leave the boat one of them stabbed him in the back

Pompey, Cneius, abt. 78–45 B.C.; Roman soldier; eldest son of preceding; after battle of Pharsalia was left in possession of a formidable fleet. In 47 he collected an army in Spain, but was totally defeated by Cæsar at Munda, March 17, 45, and shortly after killed.

Pompey, Sextus, 75–35 B.C.; Roman soldier; brother of preceding; after the defeat at Munda, assembled a force and acquired possession of parts of Spain; on death of Cæsar reduced Sicily, defeated (42) a fleet sent against him by Octavius, and created such a scarcity in Rome by intercepting the corn fleets that the populace demanded that peace should be concluded with him. By this peace Sextus obtained the provinces of Sicily, Sardinia, Corsica, and Achaia. Antony refusing to give up Achaia, Sextus recommenced his piracy, and, 38, twice defeated the fleets of Octavius; but, 36, the triumvir's fleet completely defeated his own in a fight off the coast of Sicily. He fled to Asia Minor; was captured and put to death.

Pompey's Pil'lar, name given to a stone pillar erected, according to an inscription on its base, by one Publius, prefect of Egypt, in honor of Diocletian, about 296 A.D.; stands on an eminence S. of Alexandria; shaft, 73 ft. long, is of beautiful, highly polished red granite; total height of the column, 98 ft. 9 in.

Pompo'nius, Lucius, Latin poet from Bologna (Bononia), who flourished abt. 90 B.C.; famous as a writer of "Fabulæ Atellanæ." Some seventy titles and nearly 200 verses have been preserved in the citations of grammarians.

Ponce (pōn'thā), **Pedro,** abt. 1520–84; Spanish Benedictine; believed to have been the first instructor of deaf-mutes in articulation; wrote a treatise in Spanish, now lost, in which he explained his methods.

Ponce de Leon (dā lā-ōn'), **Juan,** abt. 1460–1521; Spanish discoverer; b. Aragon; distin-

guished himself in several campaigns against the Moors of Granada, 1493; accompanied Columbus on his second expedition; and became commander of the E. province of Hispaniola. He made an expedition to Porto Rico, 1508, and, 1509, reduced the island, which he governed with severity till the family of Columbus caused his removal. Having heard of the existence of a fountain which could restore youth and beauty, he set out in search of it, March, 1512, on Easter Sunday discovered and named Florida, landed (April 8th) near the present site of St. Augustine, and took possession of the country in the name of the King of Spain. After cruising several months, he went to Spain and was appointed Governor of Florida; but was not able to undertake its colonization till 1521, when he was fatally wounded by the natives, and withdrew to Cuba.

Ponce, capital of department of same name and second city in size of Porto Rico; 2½ m. N. of the S. coast; 45 m. SW. of San Juan; has two handsome squares, Plaza Principal and Plaza de las Delicias, cathedral, public library, hospitals, theaters, and numerous schools organized on the American plan. The custom-house and consular offices are at its port, Playa de Ponce. The city surrendered on demand to the army under Gen. N. A. Miles, marching from its landing point (Guanica) toward San Juan, July 27, 1898; named after Juan Ponce de Leon; pop. (1910) municipal district, 63,444; city, 35,005.

Pondichéry (pōn-dē-shā-rē'), French possession in India; on the Coromandel coast; 83 m. SW. of Madras; area, 196 sq. m.; pop. (1905) 275,384; divided into five dependencies; chief towns, Pondichéry (capital), Karikal, Chandernagor, Mahé, Yanaon; consists of a low, flat plain, with a sandy, not very productive soil, and is only partly watered by the Gingee. The capital is regularly laid out and well built, with fine promenades and plantations. Its manufactures of fine cotton cloth and cotton thread are important. Pop. (1907) est. at 46,579.

Pon'doland, district of Cape Colony, Africa; inhabited by the Ama-Pondo, a branch of the Kaffir family; area, 3,918 sq. m.; pop. (1904) 202,757; is the extreme E. coast region of Cape Colony; chiefly watered by the St. John's or Umzimvubu River; was the last of independent Kaffraria to fall, 1878, into the hands of the British, by whom a military post is maintained on the St. John; annexed to Cape Colony, 1894.

Poniatowski (pō-nĕ-ä-tŏv'skē), name of a celebrated princely family of Poland directly descended from the Italian family of the Torelli, which settled in Poland in the middle of the seventeenth century, and closely allied to the Leszczynskis and Czartoryskis. The most prominent members of the family follow: JOSEFA ANTONY (Prince), 1762–1813; Polish general; b. Warsaw; son of Andreas Poniatowski, general in Austrian service; nephew of Stanislaus Augustus, last King of Poland; commanded the Polish army against the Russians, 1792, but retired from service when the king joined the Confederation of Targovitza; fought again, 1794, against Russia under Kosciusko; went to Vienna, 1795, but returned to Warsaw, 1798; commanded the Polish army which aided Napoleon against Russia, 1807, and when the duchy of Warsaw was established by the Peace of Tilsit was appointed Minister of War. In 1812 he commanded the Polish contingent of the grand army during the Russian campaign, and distinguished himself by his valor and tactical talent. Shortly before the battle of Leipzig he was made a marshal of France, and after the battle he was charged with covering the retreat of the army, but was drowned in crossing the Elster River. STANISLAUS (Count), 1677–1762; Polish statesman; sided with Charles XII of Sweden against Augustus II of Poland; accompanied the former in his Russian campaign; after the defeat at Poltava, went to Constantinople and induced the sultan to make war on Russia; held high offices under Augustus III of Poland; father of Stanislaus Augustus Poniatowski. STANISLAUS AUGUSTUS, 1732–98; last King of Poland; b. Lithuania; ascended the throne, 1764, by the influence of Catharine II of Russia; resigned, 1795, and died at St. Petersburg; was weak, irresolute, and utterly incapable of grappling with the party fury of his subjects and the treachery of his allies.

Ponson du Terrail (pōṅ'sōṅ dü tĕr-rā'y'), PIERRE ALEXIS DE PONSON (Vicomte de), 1829–71; French novelist; b. Montmaur, Isère; began writings, 1850, with *feuilletons* in *La Mode* and *L'Opinion publique*; "Les Coulisses du Monde" founded his celebrity and gained him a special public; supplied the cheap papers with a vast number of novels of sensational adventure and incident, which were very popular.

Pontchartrain (pōnt-chär-trān'), **Lake,** body of water in Louisiana named after Jérome Phélypeaux, Comte de Pontchartrain, Minister of Marine under Louis XIV, about 40 m. in its longest dimensions E. and W. and 25 m. N. and S., the S. shore of which is but about 5 m. distant from and nearly parallel to the Mississippi River. It is separated on the W. by a peninsula of cypress swamp from Lake Maurepas, a much smaller lake, with which it is connected by the Pass Manchac. New Orleans communicates with the lake by railroad and by two canals navigable by schooners and smaller craft, one of which enters the head of the bayou St. John, by which the navigation is continued to the lake; the other is wholly artificial. The lake communicates with Lake Borgne and Mississippi Sound by the passes of the Rigolets and Chef Menteur, through which there is a tidal flow of the sea water. Fort Pike and Fort Macomb defend these passes.

Pont du Gard (pōṅ dü gär'), remains of one of the most magnificent Roman structures in France, consisting of three tiers of arches, on which the aqueduct which brought the water

of the Aure to Nîmes crossed the Gard 10 m. NE. of that city.

Pontiac (pŏn'tĭ-ăk), abt. 1712–69; N. American Indian, chief of the Ottawas; b. near the Ottawa River; at head of a body of Indians, successfully defended Detroit against hostile N. tribes, 1746. At the end of 1762 sent messengers to the different nations, proposing that in May, 1763, they should massacre the English garrisons and fall upon the frontier settlements. The plot was generally successful. Pontiac besieged Detroit for several months, but failed to take it, when most of the tribes sued for peace; but Pontiac was not subdued. He endeavored to stir up the Indians on the Miami and in other parts, and at last made a stand in the Illinois country; but, 1766, he formally submitted to the English rule; killed by an Illinois Indian at Cahokia, opposite St. Louis.

Pon'tifex, in ancient Rome, the title of a priest. The pontifices were not attached to the worship of any particular divinity, but were a college of priests superior to all others, and superintended the whole public worship. In 300 B.C. the number was nine, but it was increased by Sulla to fifteen, and by Cæsar to sixteen. The pontifices held office for life. The *pontifex maximus* was the president of the college, and acted in its name. The office was assumed by Augustus, and was held by all his successors until Gratian, who declined it. The title is now given to the pope.

Pontif'ical States. See PAPAL STATES.

Pontoniers'. See SAPPERS.

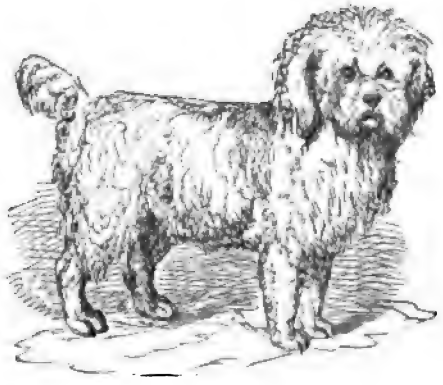
Pontor'mo, Jacopo Carucci di, 1494–1557; Italian painter; b. Pontormo; pupil of Leonardo da Vinci, Albertinelli, Piero di Cosimo, and Andrea del Sarto; imitated the latter and Michelangelo; works include "Descent from the Cross," a "Holy Family," "The Deluge," and "The Last Judgment" (last two, frescoes in Florence).

Pon'tus, ancient territory of Asia Minor, S. of the Black Sea, between the Phasis and Halys; name first applied by Xenophon; later became an independent kingdom, and included the territory between Colchis, Armenia, Cappadocia, Galatia, and Paphlagonia. Its historic celebrity is mainly due to Mithridates VI (the Great) (120–63 B.C.), who made it a great power, but who was conquered by Pompey 65 B.C.; now comprised in the Ottoman vilayets of Sivas and Trebizond.

Pontus Euxi'nus. See BLACK SEA.

Po'ny, small form of the horse. The most famous European ponies are the Shetland, Iceland, Welsh, Dartmoor, Corsican, and Greek. In N. America there are the Canadian, Sable Island, Gay Head, Sea Island, and mustang. These little animals are tough and spirited, but often vicious. See HORSE.

Poo'dle, dog distinguished by its extremely long and curly hair. This may vary from the wiry texture found in the Russian poodle to the wooly curls of the French breed; color may be brown, white, or black; weight may vary from 5 to 40 lb. Poodles are very intelligent, and



POODLE.

usually play an important part in exhibitions of trained dogs.

Pool, game played on a table similar to that used in billiards, except that at each corner and midway of the two sides "pockets" are inserted. One cue ball and object balls, numbered consecutively from 1 to 15, are employed. In the beginning of a game the latter are usually arranged in the form of a pyramid, with the apex on what corresponds to the red-ball spot of a billiard table. The cue ball is placed anywhere behind the string line, and is played at the numbered balls, the object being to drive them into the pockets; a player's turn ends with the first shot in which he fails fairly to pocket one, and the next player plays the cue ball from where he finds it, or, if pocketed, from behind the string line. There are many varieties of the game, each with elaborate rules. In *pyramid pool* each ball pocketed counts one, and (when only two play) the first to secure eight wins. Failing to hit any object ball, or driving the cue ball off the table or into a pocket, involves the forfeiture of one ball (together with any balls pocketed in the shot itself), and this is placed on the spot or as near as may be directly behind it. In *fifteen-ball pool* the forfeit is three points, and each ball secured counts its number. *Continuous pool* is played in tournaments; it is like pyramid pool, except that the game consists of any number of balls or points agreed on, and forfeitures are deducted from the player's score, instead of a ball being replaced on the table. See BILLIARDS.

Poo'na, capital of district of Poona, Presidency of Bombay, British India; on the Muta, near its influx in the Mula; 2,000 ft. above the sea; is well built, and contains the palace of the former Mahratta rulers, many fine barracks, a college, and several other educational institutions. Pop. (1901) 153,320.

Poor Man's Weath'er Glass. See PIMPERNEL.

Pope, Alexander, 1688–1744; English poet; b. London; son of a retired linen draper; published, 1709, a series of "Pastorals"; 1711,

"Essay on Criticism," a didactic poem; 1712, "The Rape of the Lock." These were followed, 1712–20, by "The Messiah," a sacred pastoral; "Windsor Forest," a descriptive piece; "The Temple of Fame"; a collection of his works which included his much-admired "Eloisa to Abelard," and a verse translation of the "Iliad." With the help of Fenton and Broome, he also translated the "Odyssey." Pope was sensitive and spiteful, and had many literary and personal quarrels. His "Dunciad" (first edition, 1728) was an attack on certain of his lampooners. He published, 1732–34, his "Essay on Man"; 1737, a volume of his "Literary Correspondence"; 1731–38, the satires and verse epistles which appeared as "Moral Essays," and "Imitations of Horace." His influence in English poetry was supreme throughout nearly the whole of the eighteenth century.

Pope, John, 1822–92; U. S. army officer; b. Louisville, Ky.; graduated at West Point and entered the topographical engineers, 1842; brigadier general of volunteers, May 17, 1861; surprised a Confederate camp at Milford, Mo., which he captured with large supplies, thus forcing the Confederate general Price to SE. Missouri. In command of the Army of the Mississippi, in coöperation with Admiral Foote, New Madrid was taken, March 14, 1862; major general, March 21, 1862; captured Island No. 10 in Mississippi River, with upwards of 6,500 prisoners, April 8th. Uniting with the combined armies under Gen. Halleck, he participated in the advance on Corinth. As brigadier general, U. S. army, July 14, 1862, he was placed in command of the Army of Virginia to which was added the Army of the Potomac. The unsuccessful battle of Manassas, or Second Bull Run, was fought August 29th–30th, and the next day, September 1st, that of Chantilly; a few days later Pope resigned and resumed command of the Department of the Northwest. He charged the failure of his operations in Virginia to the misconduct of Gen. Fitz-John Porter at the battle of Manassas. Subsequently he commanded the departments of the Missouri, the Lakes, and the Mississippi. Major general, October 26, 1882; retired, March 16, 1886; published "Campaign of Virginia of July and August, 1862."

Pope, title applied by E. Christians to all priests, and in the W. originally given to all bishops, but now restricted to the Bishop of Rome. The Roman Catholics regard the pope as the legitimate successor of St. Peter and the visible head of the Church, the invisible head being Christ. He was anciently elected by the people of his diocese, but is now chosen by the cardinals, a vote of two thirds being required to elect. Both on account of the geographical position of Rome and of the former union of temporal and ecclesiastical power in the person of its bishops, they have for several centuries been exclusively Italians. The last pope of foreign birth was Adrian VI (1522), a native of Utrecht. Protestant historians date the supremacy of the Bishop of Rome generally from about the fourth century.

The following list of the popes is taken from the work of Father Gams, O.S.B., "Series Episcoporum Ecclesiæ Catholicæ." The dates of accession of the popes up to the first part of the third century are approximative, but rest on sound calculations. Toward the end of the tenth century the custom arose of taking a new name on the occasion of election to the papacy. The usual mode of cessation of the papal office is by death, but it can be resigned, as was done by Celestine V and Gregory XII. SS. Liberius, Silverius, and Martin were exiled for a time or forever, but they remained juridically popes to their death. For brief biographies of the more important popes, see their respective names:

LIST OF THE POPES.

Name.	Accession.	Name.	Accession.
B. Peter	41	St. Deusdedit	615
St. Linus	67	Boniface V	619
St. Cletus (Anencletus)	79	Honorius	625
St. Clement I	91	Severinus	640
St. Evaristus	100	John IV	640
St. Alexander	109	Theodorus I	642
St. Sixtus (Xystus)	119	St. Martin	649
St. Telesphorus	128	St. Eugenius I	654
St. Hyginus	138	St. Vitalianus	657
St. Pius	142	Adeodatus	672
St. Anicetus	156	Donus	676
St. Soter	168	St. Agatho	678
St. Eleutherus	177	St. Leo II	682
St. Victor I	190	St. Benedict II	684
St. Zephyrinus	202	John V	685
St. Calixtus I	218	Conon	686
St. Urban I	222	St. Sergius I	687
St. Pontianus	230	John VI	701
St. Anterus	235	John VII	705
St. Fabianus	236	Sisinnius	708
St. Cornelius	251	Constantine I	708
St. Lucius	253	St. Gregory II	715
St. Stephen I	254	St. Gregory III	731
St. Sixtus (Xystus) II	257	St. Zacharias	741
St. Dionysius	259	Stephen II	752
St. Felix	269	Stephen III	752
St. Eutychianus	275	St. Paul I	757
St. Gaius	283	Constantine II	767
St. Marcellinus	296	Stephen IV	768
St. Marcellus	307	Hadrian I	772
St. Eusebius	309	St. Leo III	795
St. Melchiades (Miltiades)	309	Stephen V	816
St. Sylvester	314	St. Paschal I	817
St. Marcus	336	Eugenius II	824
St. Julius	337	Valentinus	827
St. Liberius	352	Gregory IV	827
St. Damascus	366	Sergius II	844
St. Siricius	384	St. Leo IV	847
St. Anastasius	398	Benedict III	855
St. Innocent I	402	St. Nicholas I	858
St. Zosimus	417	Hadrian II	867
St. Boniface I	418	John VIII	872
St. Celestine I	422	Marinus I	882
St. Sixtus III	432	Hadrian III	884
St. Leo I	440	Stephen VI	885
St. Hilarius	461	Formosus	891
St. Simplicius	468	Boniface VI	896
St. Felix III	483	Stephen VI. (VII)	896
St. Gelasius	492	Romanus	897
St. Anastasius II	496	Theodorus II	897
St. Symmachus	498	John IX	898
St. Hormisdas	514	Benedict IV	900
St. John I	523	Leo V	903
St. Felix IV	526	Christopher	903
St. Boniface II	530	Sergius III	904
St. John II	532	Anastasius III	911
St. Agapetus I	535	Lando	913
St. Silverius	536	John X	914
Virgilius	537	Leo VI	928
Pelagius I	555	Stephen VIII	929
John III	560	John XI	931
Benedict I	574	Leo VI. (VII)	936
Pelagius II	578	Stephen IX	939
St. Gregory I	590	Marinus II	942
Sabinianus	604	Agapetus II	946
Boniface III	607	John XII	955
St. Boniface IV	608	Leo VIII	963
		Benedict V	964
		John XIII	965
		Benedict VI	973

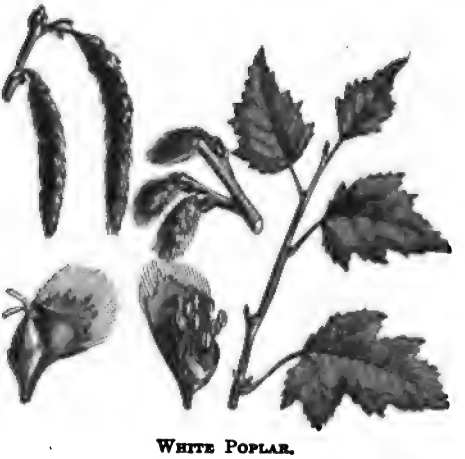
Name.	Accession.
Benedict VII	974
John XIV	983
Boniface VII	984
John XV	985
Gregory V	996
Sylvester II. (Gerbert)	999
John XVII. (Sicco)	1003
John XVIII	1003
Sergius IV	1009
Benedict VIII	1012
John XIX	1024
Benedict IX	1033
Gregory VI	1045
Clement II	1046
Damasus II	1048
St. Leo IX	1049
Victor II	1055
Stephen X	1057
Benedict X	1058
Nicholas II	1059
Alexander II	1061
St. Gregory VII	1073
Victor III	1086
Urban II	1088
Paschal II	1099
Gelasius II	1118
Calixtus II	1119
Honorius II	1124
Innocent II	1130
Celestine II	1143
Lucius II	1144
Eugenius III	1145
Anastasius IV	1153
Hadrian IV	1154
Alexander III	1159
Lucius III	1181
Urban III	1185
Gregory VIII	1187
Clement III	1187
Celestine III	1191
Innocent III	1198
Honorius III	1216
Gregory IX	1227
Celestine IV	1241
Innocent IV	1243
Alexander IV	1254
Urban IV	1261
Clement IV	1265
Gregory X	1271
Innocent V	1276
Hadrian V	1276
John XXI	1276
Nicholas III	1277
Martin IV	1281
Honorius IV	1285
Nicholas IV	1288
St. Celestine V	1294
Boniface VIII	1294
Benedict XI	1303
Clement V	1305
John XXII	1316
Benedict XII	1334
Clement VI	1342
Innocent VI	1352
Urban V	1362
Gregory XI	1370
Urban VI	1378
Boniface IX	1389
Innocent VII	1404
Gregory XII	1406
Alexander V	1409
John XXIII	1410
Martin V	1417
Eugenius IV	1431
Nicholas V	1447
Calixtus III	1455
Pius II	1458
Paul II	1464
Sixtus IV	1471
Innocent VIII	1484
Alexander VI	1492
Pius III	1503
Julius II	1503
Leo X	1513
Hadrian VI	1522
Clement VII	1523
Paul III	1534
Julius III	1550
Marcellus II	1555
Paul IV	1555
Pius IV	1559
St. Pius V	1566
Gregory XIII	1572
Sixtus V	1585
Urban VII	1590
Gregory XIV	1590
Innocent IX	1591
Clement VIII	1592
Leo XI	1605
Paul V	1605
Gregory XV	1621
Urban VIII	1623
Innocent X	1644
Alexander VII	1655
Clement IX	1667
Clement X	1670
Innocent XI	1676
Alexander VIII	1689
Innocent XII	1691
Clement XI	1700
Innocent XIII	1721
Benedict XIII	1724
Clement XII	1730
Benedict XIV	1740
Clement XIII	1758
Clement XIV	1769
Pius VI	1775
Pius VII	1800
Leo XII	1823
Pius VIII	1829
Gregory XVI	1830
Pius IX	1846
Leo XIII	1878
Pius X	1903
Benedict XV	1914

See Apostolic Succession.

Popham (pŏp'ăm), **George,** abt. 1550–1608; English colonist; b. Somersetshire; associated with his brother John and Sir Ferdinando Gorges as a patentee of an extensive territory in what is now the State of Maine; landed with a party, August 15, 1607, at the mouth of the Kennebec, or Sagadahoc, and built a rude fort, which they named Fort George. This was the first English settlement in New England. After Popham's death, the colonists, discouraged, returned to England.

Pop'ish Plot. See Oates, Titus.

Pop'lar, any tree belonging to the genus *Populus* and family *Salicaceæ*. Poplars have a light, white wood, which is perishable if exposed to the weather or if not carefully seasoned. The common balsam poplar, tacamahac, or balm-of-Gilead tree (*P. balsamifera*) produces a copious fragrant resin on its buds; it is a handsome tree, of N. America and Asia. Several of the poplars of the U. S. are called cottonwood, although this name is popularly applied to the Carolina poplar (*P. monilifera*). The cottonwoods are useful for fuel and timber, but liable to warp. The white poplar, or American aspen (*P. tremuloides*) is a handsome tree. The abele, or silver-leaf poplar of Europe (*P. alba*) is frequently planted in the U. S. Its timber is excellent, as is also that of the gray and black European poplars, *P. canescens* and *nigra*. The Lombardy poplar (*P. nigra*, variety *Italica*) is remarkable for the singular upward tendency of its branches.



White Poplar.

Popocatepetl (pō-pō'kăt-ă-pā-tl), quiescent volcano of Mexico; on confines of states of Mexico and Puebla; 43 m. SE. of Mexico City; height, about 17,800 ft. From about 14,800 ft. (in January) it is covered with snow. There are two principal craters; the upper and more recent one is about 1,000 ft. deep and has large deposits of sulphur.

Pop'py, any plant of the genus *Papaver* of the family *Papaveraceæ*; flower large and showy; corolla generally four-petaled, calyx two-leaved. The poppy is an annual or perennial herbaceous plant, and abounds in a milky juice. There are about a score of species, natives of Europe and Asia, most of which are found only in the warm temperate regions. By far the most important species is *P. somniferum*, from which the drug opium is obtained. (See Opium.) In the U. S. the *P. somniferum* is cultivated principally as a garden flower. The Iceland poppy (*P. nudicaule*), with white and yellow long-stalked flowers, is a spring-flowering species, grown for ornament.

Pop'ular Sov'ereignty. See Squatter Sovereignty.

Popula'tion, the total number of inhabitants of a country, district, city, or region. The population of any part of the earth's surface is determined by one or more of several causes. The most important of these may be enumerated as (1) adaptation of soil and climate to produce food; (2) natural advantages for the

manufacture of articles desired; (3) facilities for moving products from regions where there is excess to regions where there is scarcity; (4) enterprise and ingenuity of men in availing themselves of existing advantages; and (5) knowledge and public spirit in warding off the natural and artificial checks upon increase of population.

The tendency of all animal as well as vegetable life to increase in geometrical ratio is kept in check by various counteracting influences. In the case of man not only war and pestilence, but also certain social conditions, tend to retard the natural increase. In a complicated society where there are already marked social distinctions it is noteworthy that the increase among the poorer classes is more rapid than among the rich. Malthus and others have accounted for this difference by an absence of prudential conditions on the part of the poor. Where there is no hope of bettering the condition there is a tendency to recklessness of indulgence, but where wealth and social distinctions have been established, marriages on the part of the wealthier classes are often postponed, and consequently the number of children born is diminished.

Until recently the various natural and artificial checks upon the growth of population have very nearly counterbalanced the tendencies to increase. The introduction of civiliz d methods of government into countries formerly barbaric has lessened war, famine, and pestilence, and thus removed some of the most powerful checks upon growth. The general advances of civilization have tended in the same direction. The more general prevalence of hygienic methods of life, greater care in furnishing supplies of untainted water, a better understanding of the causes of various diseases and the means of preventing them, and, above all, the more general adoption of sanitary drainage, have tended very greatly to diminish the death rate and so remove some of the checks upon the increase of population. The most powerful of all influences in this direction have been the methods and facilities introduced within the nineteenth century for the more easy distribution of surplus p-oducts. Regions which formerly seemed incapable of supplying the necessities of mankind are now supplied from remote regions, and the consequence is that all over the civilized world population has increased with a rapidity hitherto entirely unknown. Within one century the population of the various countries of Europe has increased more than it had increased for several centuries before.

The density of the population per square mile in various countries in 1910 is indicated by the following figures: Belgium, 661; England, 626; Netherlands, 460; Japan, 344; Italy, 313; Germany, 310; Switzerland, 235; Austria, 224; France, 191; Denmark, 183; India, 178; Hungary, 166; Scotland, 160; Ireland, 134; Spain, 100. See CENSUS; VITAL STATISTICS.

Pop'ulists. See PEOPLE'S PARTY.

Por'beagle, shark of the genus *Lamna*, especially *L. cornubica*, a species common in the N. Atlantic, which reaches a length of 10 ft.

Por'celain. See POTTERY AND PORCELAIN.

Porch, covered and partly inclosed approach to an entrance door, as of a church or dwelling house; also, by extension, a covered or partly inclosed room or hall not necessarily leading into or connected with an inclosed building. In modern times the *carriage porch* is built well outside of the main structure, and has this peculiarity, that the carriage is not to enter the building, but only to discharge or take up its passengers.

Por'cupine, any one of various rodents characterized by the development of sharp spines among the hairs, which can be erected by the animal at will, and frequently become detached and stick in an assailant, whence the fable that the porcupine "shoots his quills." Porcupines belong to two groups—the *Hystricidæ*, with the genera *Hystrix*, *Acanthion*, and *Atherura*, peculiar to the Old World, and the *Spalacopodidæ*, with the genera *Erethizon*, *Cercolabes*, and *Chætomys*, restricted to America.

AFRICAN PORCUPINE.

The best-known species, the African porcupine (*H. cristata*), found in Spain, Sicily, Italy, and N. Africa, is a stout, heavily built animal, a little over 2 ft. in length. The common porcupine of N. America, *E. dorsatum*, is prevailing gray or blackish, and large specimens attain a total length of nearly 3 ft. The quills are comparatively short, being in winter almost concealed by the long hair. This species is found from Maine to the W. through the N. part of the U. S. and over a great part of British America. In the W. it is replaced by another species, *E. epixanthus*, distinguished by the yellowish color of the long outer hairs.

Porcupine Ant'-eater. See ECHIDNA.

Pore, very narrow passage in any solid substance; particularly a duct of the glands in the skins of animals. The largest and least abundant of these are the ducts of the sebaceous glands, which secrete an oily substance. They are numerous on the head and face and near the orifices of the body, but elsewhere fewer or even wanting. The ducts of the sweat glands are most numerous on the palm of the

hand, where 2,800 have been counted in 1 sq. in. Krause estimates the number on a single person at 2,381,248.

Por'gy, name applied in different localities to any one of several different fishes. In Europe it is given to *Pagrus vulgaris*; on the E. coast of the U. S. to the scup, *Stenotomus argyrops*, and sometimes to the menhaden, *Brevoortia tyrannus*; rarely to the moonfish or angel fish, *Chætodipterus faber*.

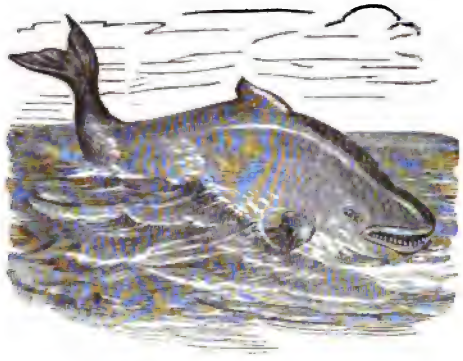
Porif'era. See SPONGES.

Poros'ity, a property of matter in accordance with which its molecules are separated by intervals or pores. The porosity, for instance, of stone or wood is proved by immersing the object in water under the receiver of an air pump; when the air is exhausted from the surface, that inclosed in the pores of the object will rise to the surface in the form of bubbles. The porosity of cast iron has been proved by forcing water through the pores of a plate 4 in. thick, and the porosity of liquids is exhibited by mixing alcohol and water, when the volume of the mixture is found to be less than the sum of the volumes of the components.

Por'phyry, 233–305 A.D.; philosopher of the Neoplatonic school; b. Batanea, Syria. His philosophical doctrines were essentially those of Plotinus, which he regards as identical with those of Plato, and substantially also with those of Aristotle. Of his fifty-six different works mentioned, only nineteen are extant, including a life of his master, Plotinus. The most celebrated of his lost works is that "Against the Christians," which was publicly destroyed, 435, by order of Emperor Theodosius II.

Porphyry (Greek, purple), rock so named from the prevalent color of the varieties used by the ancients, as the *Rosso antico*, or red porphyry of Egypt. This variety consists of a ground or paste of reddish feldspar in which are disseminated rose-colored crystals of the feldspar called oligoclase, with plates of blackish hornblende and grains of peroxide of iron. This in general is the character of porphyry; but the paste may be green, red, purple, or black, and the interspersed crystals may present various shades, usually lighter than the ground. They may be also of hornblende, quartz, aguite, olivine, and other minerals. The rock is very hard. Its principal uses are in architecture and ornamental articles, and in slabs and mullers for grinding hard powdered substances to extreme fineness.

Por'poise, any one of various small cetaceans, rarely over 8 or 9 ft. in length, belonging to the family *Delphinidæ*, properly distinguished from the dolphins, which are also called porpoises, by not having the anterior part of the head prolonged into a distinct beak. They have sharp conical teeth in both jaws, adapted for seizing slippery living prey. They go in shoals, and are found in nearly all seas, and usually not very far from land. The common species, *Phocæna communis*, known also as puffing pig and puffer, attains a length of 6 ft., has peculiar compressed teeth, and is glossy black above, lighter beneath. In favorable localities various species are taken for



COMMON PORPOISE.

their blubber, which yields oil, and for their skins, which make good leather.

Por'pora, Niccolo, abt. 1686–1767; Italian composer; b. Naples; entered on a career of great success at Venice, 1726, and, 1728, went to Dresden as director of the theater and of music in the court chapel. In 1731 he established at Naples a school of vocalism, in which Farinelli, Caffarelli, and other celebrated singers were educated. About 1750 he established himself in Vienna, where Haydn came under his influence. He was afterwards principal master at the Incurabili Conservatory in Venice. Late in life he retired to Naples, and died in indigence. His works comprise fifty operas and a great number of masses, cantatas, sonatas, etc. He figures in George Sand's novel "Consuelo."

Porse'na, or **Porsen'na, Lars,** King of Clusium, Etruria, to whom, according to legendary Roman history, the Tarquins in the second year after their expulsion from Rome applied for assistance in recovering their kingdom. Porsena besieged the city, but learning from C. Mucius Scævola that 300 noble Romans had taken an oath to kill him, made peace on the reception of hostages, and retired to Clusium.

Por'ta, Giambattista della, abt. 1540–1615; Italian natural philosopher; b. Naples. The theory of light is much indebted to his labors, and he was the inventor of the camera obscura and other optical instruments. He was a voluminous writer on a great variety of subjects, including natural magic, the art of secret writing, human physiognomy, landscape gardening, optics, curvilinear geometry, chemistry, meteorology, etc.

Portalis (pōr-tȧ-lēs'), **Jean Étienne Marie,** 1745–1807; French jurist; b. Bausset, Provence; advocate at Aix; published a celebrated memorial "On the Validity of Protestant Marriages in France"; successfully conducted famous suits against Mirabeau and Beaumarchais; imprisoned, 1794; elected to Council of Ancients, 1795; proscribed, 1797; returned from Switzerland, 1800; appointed by Napo-

leon on commission to draw up the Civil Code, of which he was chief author; later was chief author of the Concordat; leader in reorganizing the French Church.

Port Ar'thur (called by the Chinese LÜ-SHUN-K'OW), port on the Strait of Pechili, near Kin-chow-t'ing, and the SW. extremity of the province of Liao-tung or Shing-ting, Manchuria. The harbor, which is free from ice throughout the winter, is almost surrounded by hills. In 1882–91 it was made the chief naval station of China, the harbor entrance was widened to admit the heaviest war vessels, forts armed with modern guns were constructed, and a well-built town sprang up. Port Arthur was captured by the Japanese, November, 1894, and held until January, 1896; was ceded to Russia by China, 1898, and its defenses made, it was believed, impregnable. It was besieged by the Japanese from February 8, 1904, until January 2, 1905, when it capitulated. Meanwhile Rear Admiral Togo had destroyed the greater part of the Russian fleet, and had prevented the remainder from escaping from the harbor, where it had taken refuge. See MANCHURIA.

Port Arthur, a city at head of Lake Superior, in Thunder Bay District, Ontario, Canada, 3 m. E. of Fort William. It is the capital of the district and is important as a lake port and grain shipping point. Has manufactures of lumber and iron. Silver is mined in the vicinity. Pop. (1911) 11,220.

Port au Prince (pōrt ō prăns'), capital of Haiti; at head of Bay of Gonaives, on the W. coast; founded 1749; had disastrous earthquakes, 1751 and 1770; stone generally abandoned for wood in rebuilding; has beautiful environs, but neighboring mountains make it one of the hottest places on the island; commerce important; chief exports, coffee, logwood, hides, and cacao; as chief port of the republic, is somewhat fortified; pop. (1906) 75,000.

Porte, Ot'toman Porte, or **Sublime' Porte,** an official title of the Ottoman Govt. The Ottomans liken their government to a tent, at whose porte or door justice is administered and deliberations held. At Constantinople the name *Bab-i-Humayoun* (Exalted or Sublime Porte) is also applied to the main entrance of the Seraglio.

Por'ter, David, 1780–1843; American naval officer; b. Boston, Mass.; entered the navy; took part in the naval war on Tripoli, 1801–6; was captured in the *Philadelphia,* October, 1803, and held for eighteen months a prisoner; given command of the frigate *Essex,* 1812; captured the *Alert,* the first man-of-war taken from the British; sailed to the Pacific, 1813; captured several whalers and trading vessels, but his own ship was captured in harbor of Valparaiso, 1814, by two British vessels; navy commissioner, 1815–23; resigned commission, 1826, and accepted command of the Mexican navy; went as consul to Algiers, 1829; *chargé d'affaires* to Turkey, 1831; later minister resident.

Porter, David Dixon, 1813–91; American naval officer; b. Chester, Pa.; son of preceding; entered the navy, 1829; engaged in the operations of the navy on the E. coast of Mexico. In 1861 he fitted out a mortar flotilla for the reduction of forts guarding approaches to New Orleans, by the Mississippi; engaged at Vicksburg, and in autumn of 1862 was placed in command of all the naval forces on the W. rivers above New Orleans, with rank of rear admiral. In 1864 he was transferred to command of naval forces to operate against Wilmington, N. C.; fall of Fort Fisher ended his arduous war service. In 1866 he was made vice admiral and appointed superintendent of the Naval Academy; and on the death of Farragut, 1870, became admiral of the navy. Author of "Allan Dare and Robert le Diable," "The Adventures of Harry Marline," "Incidents and Anecdotes of the Civil War."

Porter, Fitz-John, 1822–1901; U. S. military officer; b. Portsmouth, N. H.; graduated at West Point, 1845; served in the war with Mexico; at West Point, 1849–55, as instructor or adjutant; assistant adjutant general, 1856; chief of staff, Department of the West, on Utah expedition, 1857–59; in April, 1861, maintained railway communication through Baltimore to Washington; served in Maryland and Virginia under Gens. Patterson and Banks; appointed colonel U. S. infantry and brigadier general of volunteers; took part in the Virginia Peninsular campaign, 1862; directed the siege of Yorktown; commanded Fifth Army Corps at Mechanicsville, Gaines's Mill, etc.; fought under Pope the memorable second battle of Bull Run. After commanding the defenses of Washington S. of the Potomac, Porter rejoined the Army of the Potomac, then in Maryland and after the battle of Antietam followed the enemy into Virginia, and with his corps alone fought the battle of Shepherdstown. In January, 1863, he was tried by court-martial for alleged disobedience of orders under Pope given before the second battle of Bull Run, declared guilty, and cashiered. A reëxamination resulted in his vindication, 1878. He was restored to the army as a colonel of infantry, 1886, and at his own request retired. Police Commissioner of New York City, 1884–88.

Porter, Jane, 1776–1850; English novelist; b. Durham; lived successively at London, Ditton-on-Thames, and Esher; published, 1803, her popular novel "Thaddeus of Warsaw"; 1810, the equally successful "Scottish Chiefs"; wrote, at the request of George IV, "Duke Christian of Luneburg, or Traditions from the Hartz," and, besides other novels, issued a fictitious but highly circumstantial "Narrative of the Shipwreck of Sir Edward Seaward."

Porter, Noah, 1811–92; American educator; b. Farmington, Conn.; master of Hopkins Grammar School at New Haven, 1831–33; tutor at Yale, 1833–35; became pastor of the Congregational Church at New Milford, Conn., 1836; settled at Springfield, Mass., 1843; chosen Clark Prof. of Metaphysics and Moral Philosophy at Yale, 1846; president of Yale,

1871–86; author of a prize essay on "The Educational Systems of the Puritans and the Jesuits Compared," "The Human Intellect," "American Colleges and the American Public," "The Science of Nature versus the Science of Man," "Science and Sentiment," "Elements of Moral Science," "Bishop Berkeley," "Kant's Ethics," etc. Dr. Porter was the principal editor of the revised edition of Webster's Dictionary, 1864, 1880, and 1890.

Porter, William David, 1809–64; American naval officer; b. New Orleans, La.; entered the navy, 1823; lieutenant, 1833; originated the lighthouse system of the U. S.; served in Gulf of Mexico during the Mexican War; retired, 1855; reëntered navy, 1859; built and commanded the ironclad *Essex*, in the Mississippi flotilla, 1861–62; sailed down Mississippi to New Orleans, forcing a passage by several Confederate batteries; took part in engagements at Vicksburg, Baton Rouge (where he effected the destruction of the Confederate ironclad *Arkansas*), Natchez, and Port Hudson; promoted commodore, July 16, 1862.

Porter. See BEER.

Port Hud'son, post village of E. Baton Rouge Parish, La.; on the Mississippi, on a high bluff. Heavily mounted batteries were erected here, 1862, by the Confederates. A Union fleet under Farragut attempted to pass them, March 14–15, 1863, but only the flagship *Hartford* and one gunboat succeeded, the remainder being disabled. The place was besieged by Gen. Banks, May–July, 1863 (forty-five days in all), but two assaults resulted only in the loss of about 4,300 men, the Confederates losing 800, exclusive of prisoners. Vicksburg having fallen July 7th, Port Hudson capitulated July 9th, about 6,400 men, 51 guns, and 5,000 small arms being surrendered. The capture opened the entire course of the Mississippi River.

Port Hu'ron, capital of St. Clair Co., Mich.; on the St. Clair and Black rivers, at the foot of Lake Huron; 56 m. NNE. of Detroit; has a large trade in grain, lumber, and wool, and locomotive, car, and repair shops of the Grand Trunk Railway; agricultural implements, factories, grain elevators, flour mills, dry docks, foundries, carriage and wagon shops, marble works, cigar factories, engine works, breweries, bottling works, limekilns, and plant for manufacturing paper from spruce wood. The city is connected with Sarnia, Canada, by steam ferry and tunnel; settled by whites under the name of Desmond in 1686. Pop. (1910) 18,863.

Portland, capital of Cumberland Co., Me.; on Casco Bay, 63 m. SSW. of Augusta; largest and most important city in state; built on a peninsula; has a harbor, defended by forts Preble and Williams, by forts on Cushing's and Diamond islands, and by a modern torpedo system. There is connection with Boston and New York by steamboat and rail, and there are several steamship lines to Europe. The city is the winter port of the ocean steamships connecting with the Grand Trunk Railway at Montreal. Trade with Great Britain, the W. Indies, etc., is large, and the coastwise trade is extensive; Portland constitutes, with Falmouth, a customs district; value of imports for year ending June 30, 1911, $1,429,592; exports, $5,441,609. The principal industries are meat packing, fish and lobster canning, petroleum refining, manufacture of marine boilers, foundry and machine-shop products, boots and shoes, chemicals, lumber, carriages and sleighs, paints and oils, edge tools, and leather. Shipbuilding is carried on extensively. The fisheries employ a large fleet; the stock yards here are of great extent. Portland was settled by the English, 1632; destroyed by the Indians, 1676, and by the French and Indians, 1690; bombarded and burned by a British fleet, 1775; incorporated as a town, 1786; as a city, 1832; suffered severely from fire, 1866. Pop. (1910) 58,571.

Portland, capital of Multnomah Co., Ore.; on Willamette River, 12 m. above its confluence with the Columbia; 120 m. from the ocean; built on sloping ground, the river dividing it nearly in the middle. Its location at the head of deep-water navigation on the two rivers makes it in reality a seaport. It has regular communication by steamers with the principal ports on the Pacific coast, Puget Sound, the Columbia River, and those of Alaska, China, Siberia, and Japan. Chief manufactures, lumber, furniture, bridges, malt liquors, tents, awnings and sails, foundry products, woolen goods, carriages, flour, fur garments, paints, oils, soap, brooms, cereal food. Slaughtering and meat packing are important industries. Capital invested in manufactures (1909), $37,996,000; value of products, $46,861,000. Shipments of lumber, flour, wheat, oats, potatoes, fruit, beer, salmon, iron, hardware, lath, and shingles are very large. Value of imports for year ending June 30, 1911, $2,662,616; exports, $9,802,319. Portland was laid out, 1845; incorporated as a city, 1851; site of Lewis and Clarke Exposition, 1905. Pop. (1910) 207,214.

Portland Cement'. See CEMENT.

Portland Vase, cinerary urn of dark-blue glass discovered in a tomb near Rome abt. 1632; deposited in the Barberini Palace, Rome; sold to Sir William Hamilton, 1770; came into possession of the Duchess of Portland; placed on exhibition in the British Museum; broken in pieces by a miscreant visitor, 1845; was skillfully repaired, but is no longer exhibited.

Port Lou'is, capital of British colony of Mauritius; protected by forts and a strong citadel; is inclosed by picturesque mountains, except toward the ocean; regularly built; has a good harbor, barracks, public library, botanic garden, and headquarters of the commercial interests of the colony. Pop. (1901), with suburbs, 52,740.

Port Mahon', capital of Minorca; on the SE. coast; has one of the finest harbors in the Mediterranean, extending about 5 m. inland, and capable of holding a fleet of warships; is a

strongly fortified naval station; has salt and oyster-canning works; exports cattle, cotton, shoes, and honey. Pop. (1900) 17,975.

Port of Spain, or **Span'ish Town,** capital of island of Trinidad; on Gulf of Paria; is the entrepôt for much of the English trade with the N. part of S. America; regular lines of steamers connect it with Europe, the U. S., Venezuelan ports, and the Orinoco. The harbor is safe, but vessels are obliged to anchor at some distance from the shore. Pop. (1901) 54,500.

Por'to Ri'co (Spanish, PUERTO RICO), island of the U. S.; smallest of the Great Antilles; separated from Santo Domingo on the W. by the Mona Passage; has the Virgin Islands on the E.; area, 3,435 sq. m.; with dependent islands of Vieques, Mona, Culebra, etc., 3,790; pop. (1910 census) 1,118,012; about one third being mulattoes and negroes; chief towns, San Juan, Ponce, Mayaguez. Island traversed E. to W., a little S. of the middle of its breadth, by a broken range of mountains (the Sierra de Cayey, Cordillera Central, etc.), culminating in the NE. in the peak of El Yunque, 3,609 ft.; land N. and S. of this range undulating, hilly, and deeply cut by streams; largest rivers, the Rios Loiza, Bayamon, Morovis, Arecibo, Blanco, all N. of dividing ridge; no navigable streams; good harbors few; forest areas small, but abounding in valuable woods; government forest preserve, the Luquillo, covers about 65,000 acres. Climate seldom severe, even in the summer months; annual temperature at San Juan, 78° to 82°; annual rainfall, 60 to 100 in.; hurricanes occur not infrequently; earthquakes rarely, and are not violent.

Mineral products include gold, silver, iron, copper, bismuth, tin, mercury, platinum, phosphates, and nickel. There are productive salt works. Chief agricultural products, coffee, sugar, tobacco, cotton, oranges, bananas, pineapples, and many kinds of vegetables. Stock raising a growing industry. Chief articles of export, sugar and molasses, cigars and leaf tobacco, fruits and nuts, cotton (raw and manufactured), coffee, hides and skins, straw and palm manufactures; chief imports from the U. S., rice, iron and steel manufactures, cotton goods, meats, lard, and dairy products, breadstuffs, manufactures of leather, timber, lumber, and wood. Value of imports domestic and foreign merchandise year ending June 30, 1911, $38,786,997; exports, $39,918,367, against $12,750,000, the highest figures under Spain. High, normal, and agricultural schools have been established; primary education is compulsory. San Juan has a Jesuit college.

Porto Rico was discovered by Columbus, 1493; conquered by the Spaniards under Ponce de Leon, 1509–18, and the natives exterminated; ceded to the U. S. as a result of the war with Spain, 1898; has a governor and executive council, appointed by the President of the U. S., and a house of delegates, elected by the people, these together constituting the Legislative Assembly.

Port Roy'al, town in Beaufort Co., S. C.; 4 m. S. of Beaufort; noted for one of the earliest settlements made by the Spaniards within the present limits of the U. S., for important events during the Civil War, and as the rendezvous of the N. Atlantic squadron of the navy. The harbor is one of the finest in the world, and has a large dry dock. Pop. (1910) 363.

Port-Royal (properly PORT-ROYAL DES CHAMPS), monastery for Cistercian nuns founded 1204 at Chevreuse, near Versailles, France; became a noted educational institution and lost to some degree its religious character; was reformed, 1608, by its abbess (see ARNAULD, MARIE ANGÉLIQUE); became Jansenistic. A branch, called Port-Royal de Paris, was established in Paris, 1626; original institution then became known as Port-Royal des Champs, at which place a new building was erected. The old building was erected by pious and learned men and became a famous Jansenist school. In 1690 the two monasteries were separated; Port-Royal des Champs was reorganized under the influence of the Jesuits, and existed until 1790; was suppressed, 1709; the nuns, for upholding Jansenism, were imprisoned in various monasteries.

Port Saïd (sä-ēd'), town of Egypt, at junction of the Suez Canal with the Mediterranean; grown up since the beginning of the canal, 1859. The inner harbor, on Lake Menzaleh, contains vast dockyards. About 2,000 ships, chiefly steamers, enter the port annually. Here is a colossal statue of De Lesseps. Pop. (1907) 49,884.

Ports'mouth, town of Hampshire, England; on island of Portsea; 23 m. SE. of Southampton. The limits of the muncipal and parliamentary borough, which are identical, comprise Portsmouth proper, town of Portsea, suburbs of Landport and Southsea, and nearly the whole of Portsea Island. Its fortifications include the Hilsea lines and the forts of Portsdown Hill on the land side and the Spithead forts on the sea side. Portsea has a convict prison. Southsea is a fashionable watering place. Portsmouth harbor, 400 yards wide at its entrance between Portsmouth and Gosport, expands into a basin, stretching 4 m. inward, and affords anchorage to large war vessels at all times. The dockyard, the most important establishment of the kind in Great Britain, covers an area of 293 acres. Brewing is carried on, and there is considerable traffic in coal, timber, cattle, and agricultural produce. Portsmouth's importance began with Henry VIII; the town was fortified by Edward IV; and the works were continued at intervals afterwards. In 1642 it was taken by the Parliamentary forces. Pop. (1911) 231,165.

Portsmouth, capital of Scioto Co., Ohio; at confluence of the Ohio and Scioto rivers; at S. terminus of the Ohio and Erie Canal; 100 m. S. of Columbus. The region is rich in agricultural lands and mineral resources, particularly iron ore; city is a shipping point for a large variety of productions. Industrial establishments include rolling mills, iron and steel works, extensive shoe factories, lumber and planing mills, flour mills, stove foundries, sev-

eral distilleries, fire-brick plants, furniture and veneer factories, and wheel works. Pop. (1910) 23,481.

Portsmouth, capital of Norfolk Co., Va.; on Elizabeth River; opposite Norfolk, with which it is connected by ferry. The U. S. navy yard, officially known as the Norfolk Navy Yard, is at Gosport, the S. extremity of the city. There are also a large dry dock, naval hospital, and marine barracks. With Norfolk it constitutes a U. S. customs district, from which are exported large quantities of cotton, lumber, oak staves, naval stores, pig iron, and, to N. cities, early vegetables; pop. (1910) 33,190.

Por'tugal, republic of Europe, occupying the SW. part of the Iberian Peninsula, between Spain and the Atlantic; area (continental portion), 34,254 sq. m.; of the islands of Madeira and the Azores, 1,236; pop. (1900) Portugal proper, 5,016,267; towns of over 20,000, Lisbon (capital), Oporto, Braga, Setubal, Funchal (Madeira). Colonial possessions in Africa (Guinea, Angola, etc.) and Asia (Goa, Timor, Macas, etc.) have area of 802,952 sq. m.; pop. abt. 9,150,000. The N. part of Portugal is essentially mountainous, and its scenery picturesque. The Serra de Estrella crosses the center. Its peaks attain 6,539 ft. S. Portugal consists of plains and rolling lands, varied toward the SW. by spurs of the Sierra Morena. Principal rivers rise in Spain; Minho and Guadiana, on the frontiers, are navigated by boats; Douro, which crosses the mountain region, also navigable for barges, and its mouth forms the harbor of Oporto; Tejo, or Tagus, crosses the S. plain, and its broadened mouth is the harbor of Lisbon. The N. and S. coasts generally rocky. Between Oporto and Cape Carvoeiro are extensive sand dunes, backed by marshes. Climate mild and equable; on the coasts frosts are rare. Olives and oranges grow well nearly everywhere, and palms flourish in the S. Rains are abundant. Available lands are generally very fertile. The cork oak grows wild and is cultivated. Most important mineral products, copper, antimony, manganese, lead, and salt from the coast lagoons; a little gold, zinc, iron, and coal are obtained. Chief agricultural products, maize, wheat, rye, oranges, olives, grapes for making wine; raising of oxen, sheep, goats, and swine an important industry. Principal articles of manufacture, wine, olive oil, canned fruits, cotton and silk thread, and cloths, veil stuffs, gold and silver filigree work, shoes, gloves. Cod, sardine, tunny, and whale fisheries employ nearly 38,000 men. Most important exports, wine (including port), cork, fish, cotton and yarn, copper ore, olive oil, fruits and vegetables, timber.

Portuguese, like the Spanish, descended from Celto-Iberic tribes, more or less modified by Latin, Visigothic, and Moorish blood; their language strongly resembles the Spanish. Educated class comparatively small, but has nearly all the wealth and influence. Government a constitutional monarchy. Parliament consists of a house of peers and a house of delegates. Adult males who can read and write and have a clear income of 100 milreis possess the right of suffrage. Army on footing, 33,446 officers and men; war footing, 175,000; navy includes one armored cruiser and five protected cruisers. State religion the Roman Catholic, but other creeds are tolerated. Primary education nominally compulsory, but illiterate class still very large. Lisbon and Oporto have schools of medicine, law, fine arts, technology, etc. The Univ. of Coimbra is one of the oldest and most celebrated in Europe. Portugal, wrested from the Mohammedans abt. 1098, became the dowry of the daughter of Alfonso VI, Prince of Castile, who married Henry of Burgundy. Henry's son Alfonso Henriques (1128–85) took the title of king, drove the Moors S. and captured Lisbon. Abt. 1250 the Moors were finally driven from Algarve; revolution, 1383, caused throne to pass from the house of Burgundy to that of Aviz; John II (reigned 1481–95) broke the power of the nobles and made the crown absolute. Period 1419–1500 made notable by explorations of Bartholomeu Diaz, Vasco da Gama, etc.; colonization in Asia and S. America (Brazil), and the turning into Brazil of the whole stream of E. trade. Portugal was conquered by Philip II of Spain, 1580, and its commerce swept from the seas by the Dutch; independence gained with the support of England, 1640, and the crown given to the house of Bragança (still reigning). The Dutch, who had seized parts of Brazil, were driven out, 1654. Leading events since 1800: Flight of court to Brazil on French invasion, 1807; final deliverance of the country by the English, 1812; adoption of a popular constitution, result of a revolution, 1820; forced signing of same by King John, who returned from Brazil, 1821; usurpation of throne by Dom Miguel, 1828; overthrow of Miguel by Dom Pedro, former Emperor of Brazil, and placing on the throne of the latter's daughter Maria, 1834. On October 5, 1911, a revolution in Lisbon deposed the young king Manuel II and a republican form of government was established.

Port'uguese East Af'rica, a colony bounded N. by the former German E. Africa, the Rorrima River forming part of the boundary; E. by Mozambique Channel; W. by Lake Nyassa, Rhodesia, and the Transvaal; chief divisions, Mozambique, Zembesia, and Laurenço Marques; area, 293,400 sq. m.; pop. abt. 8,250,000; chief ports, Mozambique, Ibo, Quilimane, Chinde, Beira, Inhambane, Lorenço Marques; surface mountainous in part; chief rivers, Rovuma, Zambesi, Limpopo; mineral products, gold, copper, coal, etc.; chief agricultural products, cotton, sugar, coffee, tobacco; exports, mainly rubber, ores, beeswax, cottons.

Portuguese Man-of-War, one of the group of *Hydrozoa,* belonging to the family *Siphonophoræ.* It is a free-swimming colony, the individuals of which have become highly differentiated. They are oceanic, and consist of a bladderlike expansion, which serves as a float, with a saillike crest on its upper side; from this are suspended individuals resembling great streamers, sometimes many feet in length, without mouths, but loaded with nettle cells

that enable them to capture the food, which is conveyed to the second type, the nutritive polyps. Each of these is a simple tube, bearing a mouth, and within them the food is digested and distributed by means of a branching gastric cavity extending throughout the entire colony. Then there are individuals, like mouthless jellyfishes, which bear the eggs and care for the perpetuation of the colony; and, besides these, there may be some whose duty it is to defend the rest, and others whose active swimming movements, together with the wind, drive the colony about. The American species, *Physalia arethusa*, is brilliantly colored, the float being pink or purple and bright blue. It is armed with powerful batteries of nettle cells, and contact with them will cause severe pain in man. Most of the species inhabit tropical seas.

Portula'ca. See PURSLANE.

Po'rus, Greek form of the name of several kings of India, two of whom were met by Alexander in his conquest of the East. The first ruled E. of the Hydaspes, the passage of which he disputed, but Alexander prevailed by superior generalship. Porus, being captured, was honorably treated, and became the ally of Alexander, who enlarged his dominions, so that they extended from the Hydaspes to the Hyphasis. His cousin of the same name ruled over Gandaris, E. of the Hydraotes. He fled on the approach of Alexander, and his dominions were given to his kinsmen.

Posei'don. See NEPTUNE.

Po'sen, capital of province of Posen, Prussia; at confluence of the Zybina and Warthe; 150 m. E. of Berlin. The Prussian Govt. has made it one of its great fortified places. It contains many fine buildings, including a town-hall and a cathedral, several good educational and benevolent institutions, and manufactures of tobacco, sealing wax, wax candles, leather, furs, liqueurs, gold and silver ware, woolen and linen fabrics, arms, and carriages. Posen is the seat of a Roman Catholic archbishopric. Pop. (1905) 136,800.

Posidon'ius, abt. 135–51 B.C.; Greek Stoic philosopher; b. Apamea, Syria; studied at Athens; settled in Rome, where he founded a school, which Cicero attended; was an extensive traveler; made ambassador to Rome, 86; greatest work, a history in fifty-two books, continuation of Polybius, embracing the period 145–82 B.C.

Posi'tion Find'ers. See RANGE AND POSITION FINDERS.

Pos'itivism, system of philosophy and religion founded by August Comte (1798–1857). Comte maintained that the phenomena of society conform to fixed and ascertainable laws, no less than the phenomena of chemical combination or planetary rotation. Comte's first position is that the human mind, historically and individually, passes through three stages of development—the theological, the metaphysical, and the positive, or scientific. In this last it is discerned that man can know nothing of causes, and is only able to refer phenomena to their general laws of existence or succession. His second position is that science proceeds in a regular order, from the elementary relations of numbers to the highest complications of society and life. The "hierarchy of the positive sciences" thus came out in the following order: (1) Mathematics, (2) astronomy, (3) physics, (4) chemistry, (5) biology, (6) sociology (the most complex and specialized of all).

As a result of his personal experiences, abt. 1845 Comte developed his philosophy into a religion of humanity. Religion he conceives to be the complete harmony of human existence in one Great Being, whom he calls Humanity. Religion, at first spontaneous, dissipates itself in fetichism and polytheism; next, inspired, it lifts its thoughts to the vague abstract unity of God; and finally, revealed or demonstrated, it finds its object in a living and active being, which is humanity. There was to be a class of philosophers corresponding to the class of priests under the old *régime*, with unlimited control over opinions. Marriage and an encyclopedic education were among the chief qualifications for the hierarchy. The archphilosopher, or "high priest of Humanity," was to supersede the pope; and Paris was to be the holy city of the Positivist.

A new calendar was to be instituted, made up of saints' days, save that philosophers, poets, legislators, inventors, etc., were to be substituted for the saints of the old calendar; and for the Virgin Mother an antitype was found in the ideal of Humanity, symbolized as "a woman of thirty with a child in her arms." The group of Positivists in France and England is numerically small, but intellectually of high order. Veneration for woman as mother and wife permeates the whole of Positivism and is its most distinguished practical characteristic.

Pos'se Comita'tus, law Latin phrase, meaning literally "the power of the county." By the common law the sheriff while engaged in executing process was authorized to summon to his aid, if necessary, all the men above the age of fifteen years within the county, with the exception of the sick or infirm, ecclesiastics, and peers, and they constituted the *posse comitatus*. The same authority is given to the sheriff in the U. S., although its exercise is often regulated by statute. The ordinary cases in which such a resort is had to the assistance of private citizens are the quelling of riots, the overcoming of forcible seizures or detainers of land, the subduing of forcible rescues made or attempted of persons arrested pursuant to the command of a proper writ, and the resistance to any forcible measures in opposition to the execution of public justice.

Post'al Serv'ice, that branch of the public service which is concerned particularly with the conveyance and delivery of letters and other documents, newspapers, book packets, etc.; the issue of money orders, and, in some instances, with the managements of telegraphs, telephones, savings banks, etc.

The beginning of the present postal systems of the world are to be found in lines of cou-

riers, which rulers established for prompt transmission of governmental decrees and dispatches. The earliest known system was that established 559 B.C. by the King of Persia, who maintained relays of mounted men at six stations to forward his messages. Systems of this kind existed among the Romans in the time of Augustus (31 B.C.), and in France under Charlemagne; but the first actual letter post for commercial purposes appears to have originated in the Hanse towns early in the twelfth century. As early as 1252 royal messengers, called *muncii*, were employed in England for conveyance of letters; but until the time of Henry VIII no regular system of posts existed in England. In 1609 James I of England issued the proclamation forbidding all persons, not authorized by the master of the post, from collecting and delivering letters. This was the beginning of the state monopoly of letter carrying in England. In 1784 mail coaches were introduced. Steamships were first used for the conveyance of mail in 1821, and railways in 1830.

The post office existed in America from its earliest settlement. Originally it was merely a receptacle in the coffee-house, where letters arriving from abroad were deposited, to be taken by those to whom they were addressed, or carried to them by their neighbors. The first legislation on the subject is found in the records of the General Court of Massachusetts, 1639. The colonial law of Virginia, 1657, required every planter to provide a messenger to convey the dispatches, as they arrived, to the next plantation.

Postage or fixed charges for the conveyance of letters was first introduced into England abt. 1635, and until 1874 the rates fixed for various weights and distances changed frequently. In 1837 the utility of the post office in England was increased by the adoption of a uniform low rate for postage, a charge by weight and prepayment. Previous to this time postage was paid by the recipient. Stamps came into use in Great Britain in 1840, and were adopted by most countries during the following decade. In 1874 an international postal congress was held in Berne; in 1875 a postal union was organized, and the following uniform postage adopted: Five cents on prepaid and ten cents on unprepaid letters weighing not over ½ oz.; newspapers not over 2 oz. in weight, one cent; books and other printed matter, samples, and patterns, not exceeding 8¾ oz., one cent for each 2 oz.; postal cards, two cents. The union now embraces nearly every country in the world. Since October 1, 1908, penny (two cents), postage has obtained between the U. S. and Great Britain. Since January 1, 1909, a rate of two cents has been fixed for letters between Germany and the U. S., provided the letters passed by sea direct, and not by way of Great Britain or France.

Registration was introduced into England in 1814, and a system of insurance was established in Great Britain in 1892. In U. S. registration was introduced in 1854; an indemnity not to exceed $25 is now paid by the U. S. for the loss of a domestic registered package. Special delivery was introduced into the U. S. in 1885. A fee of ten cents secures immediate delivery by special messenger. Until 1774 there was no free delivery in England except in a few larger cities and towns. In the U. S. the free-delivery system in large cities was begun in 1863. This was extended in 1887 to all cities with a population of over 10,000, or of postal revenue of $10,000. In 1901 rural free delivery was instituted in the most favorable localities, and in 1911 there were in operation 41,559 routes. The money-order system had its origin in 1792, in a private venture of three English post-office clerks. In 1838 this business was incorporated with the post office. The system was introduced into the U. S. in 1864, and the number of domestic money orders issued in 1910–11 was 81,906,206; amount, $590,034,433; fees, $4,840,723; the number of international money orders, 4,060,431; amount, $97,681,211; fees, $1,089,453.

The collection and distribution of mail has been facilitated by the use of railways, electric and cable-car routes, and also post-office cars, wherein the letters are sorted *en route*. Pneumatic-tube service is also in operation in our larger cities. The number of railway routes in operation in 1911 were 3,378, with a length of 223,900 miles. The annual rate of expenditure for this service was $46,172,473. In 1911 there were 1,657 lines of railway post offices on railroads, steamboats, and electric cars, operated over a total of 263,067 miles of routes. The expenditures for this service were $20,101,303. The total cost of sending the U. S. mail to foreign countries by sea for the year ending June 30, 1911, was $3,315,349. The international parcel post was established in 1910–11 with Brazil and Haiti, making a total of 42 countries with which the U. S. has conventions. The weight of matter dispatched from the U. S. was 1,824,623 lb., and the weight received from foreign countries was 1,680,724 lb.

In the fiscal year, 1917–18 there were 54,343 post offices in operation in the U. S. The extent of the postal routes was 472,726 miles; railroads on which mail was carried operated, 26,053 miles; the railway mail service had 20,164 employees; and the expenditures for this service was $28,789,142. Postal cards issued, 707,111,300; ordinary postage stamps issued, 13,065,784,852.

TABLE SHOWING GROWTH OF POSTAL SERVICE.

Fiscal Year Ending June 30.	Receipts.	Expenditures, Postal Service.
1900	$102,354,579	$107,740,267
1901	111,631,193	115,554,920
1902	121,848,047	124,785,697
1903	134,224,443	138,784,487
1904	143,582,624	152,362,116
1905	152,826,585	167,399,169
1906	167,932,782	178,449,778
1907	183,585,005	190,238,288
1908	191,478,663	208,351,886
1909	203,562,383	221,004,102
1910	224,128,657	229,977,224
1911	237,879,823	237,648,926
1918	388,975,962	324,833,728

Parcel Post Service,—A branch of the U. S. postal service, provided by act of Congress, ef-

fective on Jan. 1, 1913. It is divided into two parts—domestic service and international service, each constituting a convenient, quick, and efficient means of transporting mailable parcels to any post office in the U. S., its possessions, or in countries with which the U. S. has reciprocal postal agreements. Parcels may be insured against loss and may be sent C. O. D. The weight limit is 50 pounds in the first and second zones and 20 pounds in the remainder.

Post Of'fice Depart'ment, in the U. S., a department of state provided by congressional act of 1794. The head of the postal service is the Postmaster General, who has been a Cabinet minister since 1829. Under him are four Assistant Postmasters General (appointed by the President), of whom the first is the general executive, in charge also of the Dead-letter Office, the free-delivery service, and the money-order system; the second has charge of the transportation of all mail matter; the third is the bookkeeper of the department and attends to the issuing of stamps and the classification of the mail matter; and the fourth manages post-office inspections, receives the bonds of postmasters, appoints fourth-class postmasters, etc.

Post-mor'tem Examina'tion, or Au'topsy, examination of the body to determine the cause and manner of death. In cases of poisoning the nature of the poison and possibly the manner of its administration may be determined; in death from violence the examination will often reveal the nature of the weapon used in the infliction of the wounds and the relative positions of the victim and assailant at the time. Such examinations are also made in order to study the lesions which are produced in various organs as the result of disease. The incisions are made in such a manner that the least possible trace of them is visible when the body is again dressed.

Post-ter'tiary Pe'riod. See PLEISTOCENE PERIOD.

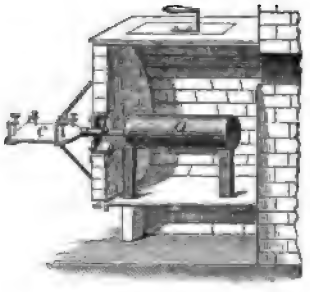
Pot'ash. See POTASSIUM.

Potas'sæ Bitar'tras. See CREAM OF TARTAR.

Potas'sium, metallic element discovered by Davy, 1807, while experimenting on the action of a powerful electric current on molten caustic potash (potassium hydroxide, potassic hydrate). *Potash* is potassium carbonate, a constituent of wood ashes, from which caustic potash is obtained. The metal can be made by distilling at a white heat an intimate mixture of potassium carbonate and charcoal, and this method is now used on a large scale.

Potassium has a bright metallic luster on its freshly cut surfaces, but this quickly tarnishes on account of the ease with which moisture acts upon it. The metal is soft, and lighter than water. When thrown upon water the latter is decomposed, the products of the action being potassium hydroxide (KOH) and hydrogen. The heat evolved is sufficient to set the hydrogen on fire, and at the same time a little of the potassium is burned, so that the flame has the characteristic violet color of potassium flames. The symbol of potassium is K; its atomic weight 39.

Potassium occurs in many minerals, principally in feldspar, which is widely distributed. It occurs in combination with chlorine as carnallite and sylvite; in combination with sulphuric acid and aluminum as alum; with nitric acid as saltpeter or potassium nitrate; is found, further, in combination in all soils in consequence of the natural decomposition of the minerals containing it; is taken up by plants, and when vegetable matter is burned



POTASSIUM FURNACE.

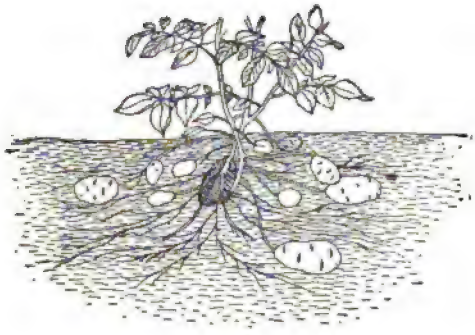
it remains behind, principally as the carbonate. Potassium occurs, further, in the form of a salt of tartaric acid in grape juice.

The compounds of potassium include *potassium bromide* and *potassium iodide,* used in medicine and photography; *hydroxide* or *hydrate,* commonly called caustic potash, made by treating the carbonate in solution with lime; *sulphides,* formed by melting together potassium carbonate and sulphur; *acid potassium tartrate,* cream of tartar; *potassium carbonate,* principal soluble ingredient of wood ashes; *potassium silicate,* prepared on a large scale by melting together quartz powder and purified potash; and *potassium ferrocyanide,* or *yellow prussiate of potash,* obtained by heating refuse animal matter with impure potassium carbonate and scrap iron, used in making Prussian blue.

Pota'to, most widely cultivated and valuable of esculent tubers; the *Solanum tuberosum* of the nightshade family, and allied to the tobacco, belladonna, and tomato plants; native of the elevated tropical valleys of Chile, Peru, and Mexico; carried to Spain from Peru early in the sixteenth century; introduced into Virginia from Florida by Spanish explorers, and into Great Britain from Virginia by Sir John Hawkins, 1565.

The potato is a perennial plant, with smooth, herbaceous stems, from 1 to 3 ft. in height, with pinnate leaves, flowers varying in breadth from 1 to 2 in., and in color from bluish white to purple, and consisting of a wheel-shaped corolla, more or less veined, bearing a globular, purplish fruit or seed ball of the size of a gooseberry, and an herbage characterized by a narcotic smell, and practically useless, though it may be eaten by cattle and, like spinach, by man. One of the leading qualities of the potato is an extraordinary productiveness, far exceeding that of any esculent with which it can

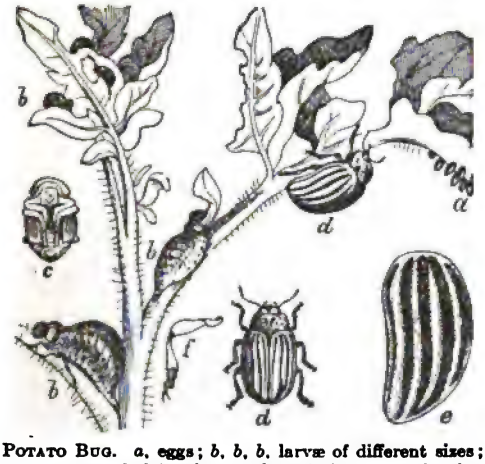
be placed in competition, an equal amount of ground yielding, according to Humboldt, thirty times greater weight of potatoes than of wheat. Potatoes consist almost wholly of starch, and are accordingly deficient in nitrogen and ill adapted for an exclusive diet. They are



Potato Plant.

hardy, and grow well throughout a vast extent of the earth's surface. In 1911 the production in the U. S. of the species known as the Irish potato was 292,737,000 bu., valued at $233,778,000, from 3,619.000 acres; most productive states, Wisconsin, 32,480,000 bu.; Michigan, 31,020,000; New York, 27,750,000; Minnesota, 25,875,000; Maine, 21,240,000; all others being under 20,000.000.

Potato Bug, name applied indiscriminately by farmers to a great many different insects that attack the potato, but commonly applied to the Colorado potato beetle (*Doryphora ten-*



Potato Bug. *a*, eggs; *b*, *b*, *b*, larvæ of different sizes; *c*, pupa; *d*, *d*, beetle; *e*, enlarged wing cover, showing character of primitives; *f*, enlarged leg.

lineata), a hemispherical yellow beetle about one third of an inch long, with ten black stripes on its wing cases. First described by Thomas Say, who found it on the upper Missouri, 1824. This beetle was afterwards scarcely heard of till 1859, when it appeared in large numbers about 100 m. W. of Omaha, Neb. In 1866 it occupied most of the U. S. W. of a line drawn between Chicago and St. Louis; 1874 it touched the Atlantic seaboard at numerous places, and, 1875, was common from Virginia to Maine. It thus traveled over 1,500 m. in a direct line within sixteen years and spread over an area of something like 1,500,000 sq. m. Spraying with solutions of Paris green is the cheapest effective protection to the plants attacked.

Potato, Sweet, a trailing vine of the morning-glory family, producing large thickened edible roots. The plant is widely cultivated for food in the tropics and the warmer portions of temperate countries. Its native country is unknown, but the evidence points strongly to an American origin. Its aboriginal American name was *batatas*, whence comes the word po-

Sweet Potato.

tato, later applied to the Irish, or round potato. The sweet potato is a staple crop in the S. of the U. S., where it thrives in sandy or loose soils. It is propagated by suckers or sprouts which spring from the tubers. It very rarely blossoms. There are many diseases of the sweet potato.

Potem'kin, Grigori, Prince, 1739–91; Russian statesman; b. Smolensk; originally an ensign in the army, superseded Orloff as lover of Catharine II; became practically the ruler of the empire; after crippling Turkey and founding Kherson in S. Russia, conquered the Crimea and the Kuban territory, became governor of the new possessions, dazzled Catharine with the vision of a new Byzantine empire, and on her visit, 1787, resorted to many stratagems to impress her with the splendor of her new dominions. In the following war with Turkey he conquered Otchakov, while Suvaroff won victory after victory. Catharine loaded him with honors and riches.

Potentil'la, genus of herbs and shrubs of the family *Rosaceæ*. There are many species, mostly herbs, about forty of which are natives of the U. S. The plants known as cinquefoil, five-finger, and tormentil belong to this genus.

Pothier (pō-tyā'), **Robert Joseph**, 1699–1772; French jurist; b. Orleans; judge and Prof. of French Law at Orleans; principal work, "Pandects of Justinian Digested into New Order." His "Maritime Contracts" was translated by Caleb Cushing; "Contracts of Sale," by L. S. Cushing, and "The Law of Obligations or Contracts," by W. D. Evans. Fully three quarters of the Civil Code is taken almost verbatim from his works.

Pot'hole, approximately vertical and cylindric cavity in rocks, produced by a whirling current of water; occurs on the beds of streams whose steep grades give them high velocity, and they are often many feet in depth. It is believed that potholes are formed also beneath glaciers, where crevasses permit streams of water to plunge from the surface to the base. There is a series of holes referred to this action at Cohoes Falls, N. Y., one of which is over 60 ft. deep.

Poto'mac, river of the U. S., constituting the boundary between Maryland and Virginia and W. Virginia; formed by the junction of two branches, of which the N. rises in the Alleghanies of W. Virginia and the S. in the Shenandoah range, Virginia; resembles a bow in form; is nearly 400 m. long; receives as tributaries from Virginia the Shenandoah, Savage, and Monocacy; is an estuary from 6 to 8 m. wide for 100 m. of its lower course; enters Chesapeake Bay 75 m. from the Atlantic. Washington, D. C., is 125 m. above its mouth, to which the tide ascends, and it is navigable for large vessels. Above Washington are several falls.

Potomac Forma'tion, lowest of the geological formations representing the Cretaceous period on the Atlantic coast of N. America; rocks are variegated clays, friable sandstones, gravel, and sand, with many alternations, forming a series from 5 to 500 ft. thick; rest unconformably on crystalline rocks and on upturned and eroded strata of the Newark system; are overlaid by fossiliferous Eocene and Neocene strata.

Potosí (pō-tō-sē'), capital of department of same name, Bolivia; on side of Potosí Mount, a peak of the E. Cordilleras; 47 m. SW. of Sucre; is one of the highest inhabited places in the world (13,324 ft.). The climate is cold and changeable. Silver lodes were discovered here, 1546, and were long the richest known deposits in the world. The deposits are far from being exhausted, but, owing to the great depth to which shafts have been sunk and the difficulty of drainage, most of them have become unprofitable. During the eighteenth century Potosí, with its immediate vicinity, is said to have had a pop. of 170,000. The fine mint and the cathedral attest its former grandeur. Pop. (1906) est. at 23,450.

Potosí (Mexico). See SAN LUIS POTOSÍ.

Pots'dam, city of Brandenburg, Prussia; at confluence of Ruthe and Havel, 17 m. SW. of Berlin; has many fine streets, public squares, promenades, public edifices, gates, bridges, and monuments; contains large barracks and other military establishments, educational and benevolent institutions, and a great number of royal palaces and summer houses. Here is an astrophysical observatory, with two equatorial refractors, for spectroscopic, photographic, and other observations. Potsdam was founded by Elector Frederick William, but its modern splendor is principally due to Frederick the Great. Its industries comprise market gardening, manufactures of firearms, and the production of sugar, chocolate, tobacco, and cotton and woolen goods. Pop. (1905) 61,414.

Potsdam Sand'stone, in geology, a formation of the Cambrian period occurring in New York and Canada N. of the Adirondack Mountains. It is the basal member of the New York system, and was long supposed to be the oldest American Paleozoic formation. The name has been applied also to sandstones at the base of the Paleozoic series in various other parts of N. America, but it has now become known, from a comparison of fossils, that not all such sandstones are of the same age as the Potsdam. In the district N. of the Adirondacks the sandstone has a maximum thickness of 500 ft. It is extensively quarried for paving blocks and to less extent for flagging and building stones.

Pot'stone, variety of talc, sometimes wrought, like soapstone, into pots, stoves, and kettles; abounds in Europe, and is coarser and more granular than the best soapstone.

Pottawat'tomies, tribe of N. American Indians belonging to the Algonquian family; at beginning of seventeenth century occupied the lower peninsular of Michigan; driven W. by Iroquois tribes, settled on Green Bay; then spread over what is now S. Michigan, N. Illinois, and N. Indiana; aided the French against the English; sided with the English in Revolutionary War till Wayne's victory, then signed Treaty of Greenville (1795); now composed of Pottawattomies of Huron, 75, in Michigan; Prairie Band, 560, in Kansas; and citizen Pottawattomies, 750, in Oklahoma.

Pot'ter, Paul, 1625–54; Dutch painter; b. Enkhuyzen; was unrivaled in painting domestic animals, which he invariably studied from life; best pictures are small, exhibiting exquisite finish, free handling, and brilliant effects of sunshine; but some are life size. The latter include the "Young Bull," in the Museum of The Hague. He also executed admirable etchings.

Pot'tery and Por'celain, words of several applications. Pottery denotes (1) objects made of material, generally clay, which is molded while soft and then baked till it becomes hard; (2) a place where such objects are produced; (3) the art and process of their manufacture. In a narrower and more customary sense, the word pottery is applied only to the coarser varieties of such objects; porcelain comprising the finer, translucent, or semi-translucent kinds. Both are generally made of clay, and are keramic ware (see KERAMICS), but the terms are stretched to cover some wares that are not clay wares.

ART PORCELAIN.

PREPARED UNDER THE DIRECTION OF MESSRS. TIFFANY & CO.

COALPORT ROYAL DRESDEN ROYAL WORCESTER ROYAL CROWN DERBY DOULTON, BURSLEM SÈVRES

ROYAL BERLIN MINTONS WEDGWOOD DOULTON, LAMBETH

GRUEBY FAIENCE COPENHAGEN RUSSIAN HUNGARIAN ROOKWOOD

Clay is very widely dispersed over all the continents and the larger islands of the world, and everywhere has been used for making vessels since the most remote antiquity. It is easy to mold by hand or by tools, keeps its shape well if kept moist, and can be remolded as often as desired. When baked, or *fired*, it hardens without serious shrinkage or deformation, and will then keep its shape permanently. Different kinds of clay give different colored baked wares. The clay which forms the chief ingredient of porcelain is called kaolin. This is white and mealy, and consists of decomposed feldspar. Clay made very thin, to be applied to the surface of a piece of pottery and baked with it, is called *slip*.

FIG. 1.—PHŒNICIAN VASE, FROM THE CESNOLA COLLECTION.

The glaze or enamel with which the clay body is covered in many kinds of pottery and porcelain is more diverse in composition. The extremely thin glaze of some fine kinds of ancient pottery has not been successfully analyzed. The equally thin glaze on the hard *stoneware* of which vinegar jugs, Selterswater bottles, English beer bottles, etc., are made, is produced by throwing common salt into the oven, where it is decomposed, the soda of the salt combining with the alumina of the clay to form a thin, hard silicate. Other kinds of stoneware, and some kinds of soft earthenware, are covered with a lead glaze, made from white lead, flint, fragments of glass, and other materials in smaller quantities. These are ground together to a very fine powder, and mixed with water to form a thin paste, which is applied to the surface by dipping, or with the brush. The glaze of porcelain is made of a mixture of quartz and kaolin, or of feldspar and kaolin, with small quantities of other ingredients. In all glazes the requirements are that they shall combine readily with the surface of the body, and cling to it, that they shall fuse and become vitrified at a lower temperature than that needed for firing the body, and that the surface, when baked, shall be hard and insoluble in ordinary liquids. It is also generally a requisite that the glaze should not contract so much in the firing as to crack; but the *crackle*, which is so great an ornament to many Oriental wares, is produced by allowing the glaze to shrink and separate, and then, in some cases, filling the cracks with color before another firing.

FIG. 2.—ITALIAN MAJOLICA VASE.

When a glaze is opaque and put on rather thickly, it is called *enamel*. The most common enamel is stanniferous—that is, made in part of an oxide of tin. Such an enamel is perfectly opaque, pure white, lustrous, and with a soft surface which receives color well, so that good painting on the surface of such an enamel is often more beautiful than the painting on porcelain. The pigments used for painting on pottery and porcelain are fusible or vitrifiable colors. These have often a very different appearance before firing to that which they are to give to the finished piece.

FIG. 3.—EARTHENWARE KILN.

The chief implement used by the maker of pottery or porcelain vessels is the *potter's wheel*, a horizontally revolving disk, on which the lump of clay is held, and which the workman revolves at his wish. By the rotary motion a true roundness is given to the vessel, and the soft clay is shaped and reshaped very quickly by a skillful hand, the vase or jar being drawn out larger, or spread broader, or modified in its shape by a touch as it whirls. Handles and spouts are molded separately, either by hand or in plaster molds and stuck on to the body while still soft. Elaborately modeled ornaments, figures of men and animals, and the like, whether attached to vessels or forming ornamental objects by themselves, are made with the sculptors' modeling tools.

When the shaping is done, the piece is allowed to dry somewhat before firing, but care must be taken not to let it dry so much as to crack. Common earthenware is fired only once. Glazed and enameled wares are fired once for the body and once for the covering. Painted wares are fired a third time for all colors which are applied upon the glaze, and a fourth time, always with decreasing temperatures, for gilding. The firing (in the kiln) is sometimes repeated more frequently, because the degree of heat and the length of the ex-

posure may greatly modify the color which a pigment will furnish, and because retouches and alterations need new baking. Moreover, different workmen employ different processes: thus much Japanese porcelain is fired before the under-glaze colors are applied, then fired for those colors, all before the first glaze has been put on. Some of the celebrated colors, or the cloudings and stainings of color, are the result of accidents occurring in spite of all care and skill, and some of these accidental colors it has been found impossible to reproduce at will.

Decorating is chiefly accomplished by painting with a brush, the pigments being earthy or metallic, usually metallic oxides. Borax and other materials are used as fluxes, and some kind of oil is used to facilitate the laying on. The color when fired becomes glass, either in a solid mass of some thickness or in a mere film. Some colors are applied upon the body under the glaze, but few can bear the great heat necessary for firing the body. Some painting is done upon the unbaked but dried surface of the stanniferous enamel when applied to the body; the color for this must also be very resistant. Other work is done upon the enamel after baking, and for this the low heat of the muffle is sufficient. Gold is applied with a brush, as powder, and is burnished after firing. Luster is generally metallic, the metal being very finely divided, so as to give its effect when laid on as a paint and fired without burnishing.

Besides painting with the brush, some effects are produced by putting on the color in mass and letting it trickle down the surface until stopped and fixed by the heat of the kiln. Other similar effects are got by blowing color from a tube, or splashing or sprinkling it in drops. Sometimes an accidental form, as of a seeming cloud or mountain, produced by splashing or smearing, has given a suggestion for a design, which has then been carried out deliberately. Sometimes the decoration is in form as well as color, the one aiding the other, as when a vase is covered with a raised pattern, simulating basket work, which is then heightened with color and gold. See KERAMICS.

Pott's Disease of the Spine. See SPINAL CARIES.

Potts'town, borough in Montgomery Co., Pa.; on Schuylkill River and canal; 18 m. ESE. of Reading; in an agricultural and mineral region; widely known for its manufactures, particularly of iron and steel. Besides the plant of the Pottstown Iron Company, which includes furnaces, rolling mill, steel works, and machine shops, and that of the Philadelphia Bridge Company, there are rolling mills, steel mill, nail factories, furnace for pig iron, boiler works, agricultural-implement works, cigar factories, carriage factories, planing mills, and other industrial works, including in the borough and its vicinity many creameries. Pop. (1910) 15,599.

Potts'ville, capital of Schuylkill Co., Pa.; on Schuylkill River; 35 m. NW. of Reading; in extreme S. part of the great Schuylkill anthracite coal field, where shafts have been sunk in the valleys to a depth of 1,600 ft. to reach the underlying coal beds, while on the mountainsides the coal beds crop out; is the chief shipping point of the region. It was here that anthracite coal was first successfully used for smelting purposes, 1839, and the prize of $5,000 offered by wealthy Philadelphians to the individual who would succeed in smelting iron ore with anthracite coal was awarded to the Pottsville furnace. The industrial works include furnaces, rolling mills, stove and other foundries, several boiler, engine, and machine shops, pottery, bolt and nut factories, planing mills, spike mills, shirt and stocking factories, large breweries, extensive silk mill, and bridge works. Pop. (1910) 20,236.

Pouched Rat. See GOPHER.

Poughkeepsie (pō-kĭp'sĭ), capital of Dutchess Co., N. Y.; on the Hudson; 75 m. N. of New York City and 69 m. S. of Albany; on line of several railroads, one of which crosses the Hudson on a noted cantilever bridge at an elevation of 212 ft. Poughkeepsie was settled by the Dutch at the close of the seventeenth century. The New York Legislature met here, 1778, to accept the Articles of Confederation adopted by the thirteen states. Here, also, July 26, 1788, a state convention ratified the Federal Constitution. The city is partly on a hillside sloping to the river, but largely on table-land extending E. to Vassar College, 2 m. away. At the N. is College Hill, whose summit is 500 ft. above the town. The whole of this hill, excepting the reservoir grounds, was given to the city by one of its citizens for a public park; area nearly 100 acres. Poughkeepsie is distinguished for its institutions of learning, of which Vassar College, Riverview Military Academy, Eastman's Business College, and Putnam Hall are prominent. Pop. (1910) 27,936.

Poul'try, domestic fowls, in a broad sense, including many breeds, as American, Asiatic, Mediterranean, Polish, Hamburg, French, English, Game, Game Bantam, Bantam, and Miscellaneous. The American class comprises the Plymouth Rocks, Wyandottes, Javas, Dominiques, and Jersey Blues. The Plymouth Rocks are subdivided into White, Buff, and Barred varieties, the Javas into Black, White and Mottled, and the Wyandottes into White, Golden, Silver, Buff, and Black. In the Asiatic class are included the Light Brahmas, Dark Brahmas, Partridge Cochins, Black Cochins, White Cochins, Buff Cochins, and Langshans. They are the largest of the gallinaceous fowls, the Light Brahmas leading in weight. All fowls of this class have feathered legs, and all have single combs, with the exception of the Light Brahmas and Dark Brahmas, which possess pea combs. To the Mediterranean class belong the Leghorns, Minorcas, Andalusians, and Black Spanish. The Leghorns are subdivided, according to the color of the plumage.

The fowls of the Polish class are nonsitters and excellent layers; valued chiefly for their

DARK BRAHMA HEN.

WHITE WYANDOTTE COCK.

BLACK ORPINGTON HEN.

RHODE ISLAND COCK.

BUFF COCHIN COCK.

WHITE LEGHORN COCK.

PLYMOUTH ROCK HEN.

INDIAN GAME COCK.

BLACK MINORCA COCK.

STANDARD BREEDS OF POULTRY.

beautiful plumage. The Hamburg class includes the Hamburgs and Red Caps; are beautiful in plumage; second to the Polish as ornamental fowls. The French class comprises the Houdans, Crèvecœurs, and La Flèches. The Houdan possesses a fifth toe on each foot. The Dorkings compose the English class; for the table they are unrivaled. The chicks are difficult to raise, and the adults are not well adapted to the climate of the U. S.

To the Game class belong the Malays, Sumatras, Black-breasted Reds, the various Duckwings—brown, white, pyle, and Indian. Game cocks intended for combats in the pit differ from the standard varieties in being bred without regard to color or form, as courage is more essential. The Game fowls are excellent for the table and have an abundance of "breast meat." The Game Bantam cocks should not exceed 22 oz. in weight nor hens 20 oz. The Black-breasted Reds are the favorites. Of Bantams other than Game are the Pekin (or Cochin, Booted, Japanese, white-crested White Polish, Rose-comb Black, Rose-comb White, Golden Sebright, and Silver Sebright. The miscellaneous class includes the Sultans, Silkies, Frizzles, Russians, and breeds that are considered oddities. There are six breeds of turkeys—buff, bronze, slate, white, black, and Narragansett. The leading breeds are the bronze and white. The bronze is the heaviest. There are three varieties of guinea fowls—pearl, white, and bronze. They find no sale in market, but on farms they are regarded as excellent layers and their flesh is considered delicate. Of aquatic fowls, geese are separated into the Toulouse, Embden, African, Canada, Egyptian, White China, and Brown China breeds, all rare except the first two. Of ducks, there are the Pekin, Aylesbury, Rouen, White Muscovy, Colored Muscovy, and Cayuga, all well-known breeds. The Call and East Indian are very small and are seldom kept on farms. The crested duck is bred more as a novelty than for practical purposes. It is doubtful if the Muscovy is really a duck; its period of incubation and habits approach more nearly those of the goose.

Feeding.—Laying hens require food of a character entirely different from that suitable for nonproducers. An egg is composed of twelve and a half per cent of albumen, twenty-one per cent of oil and fat, and ten per cent of mineral matter, the greater proportion of the egg being water. As grain is deficient in lime and is largely starch, it has a tendency to fatten rather than to supply the elements composing the egg. Digestion and assimilation are promoted when the food is varied, and egg production is increased when the ration is well balanced. The individual characteristics of the hens must be considered, as no two hens are alike even when of the same breed. Bulky food—such as chopped grass, clover, vegetable tops, cooked potatoes, and turnips—is essential, because grain is too concentrated. Pounded bones, meat, and milk should always be included in the ration, as they are highly nitrogenous and seldom fail to promote laying.

During the winter season the first essential is warmth, which is promoted by shelter and a liberal supply of grain. Ground food, scalded, is excellent as a morning meal, or the ground grain may be mixed with clover hay which has been cut very fine and scalded. The allowance of food should be light, and to induce the hens to exercise a small quantity of millet seed should be scattered in cut straw, leaves, or litter of any kind. No food should be given at noon. Late in the afternoon about one pound of chopped lean meat or ground bone may be allowed twenty hens, after which wheat or corn, or both, should be scattered over the ground in order that the hens may exercise in securing it. Troughs should not be used except when feeding moistened ground grain. During the summer months the hens can secure all food required on a range, as grass, seeds, and insects will be abundant. Water should be at all times where it can be procured easily by the fowls. No fixed allowance of food for a flock can be determined upon, especially when the food is varied. It will require about five pecks of corn, or its equivalent, to support a hen for a year.

Turkeys and guinea fowls thrive best on a range, and are capable of securing the whole of their food during the greater portion of the year. A meal, composed of corn or wheat, given at night, will induce them to come up regularly to roost near the dwelling house. In winter they should have grain twice a day. Geese and ducks are partial to green foods, and if grass is abundant they will have no difficulty in securing food in summer. A meal of cooked turnips, thickened with bran, given twice a day in winter, with a supply of chopped clover hay, scalded, will keep them in good condition.

Management.—Lice and disease are the chief drawbacks. If the poultry houses are kept clear of lice the fowls can then rid themselves of vermin by the use of the dust bath. Drenching the poultry house with an emulsion of kerosene is the most effective remedy. Large gray lice destroy many young chicks and turkeys; anointing the heads with a few drops of sweet oil is the remedy. Roup is the most prevalent disease, and exists in many forms, the symptoms being hoarse breathing, swelled eyes and heads, etc. There is no remedy for the disease, the most economical method being to destroy the sick birds and thoroughly to clean and disinfect the premises. Chicks should not be kept with adults until well advanced in growth, and pullets intended for laying the next season will thrive best when not with the young cockerels. The poultry house should be cleaned daily, and if the flock is confined in yards it will be an advantage to have two yards for each flock. The unoccupied yard should be used for growing green food, the top soil being turned under; in this way the yards can be kept clean. See INCUBATION.

Pound (Latin, *pondus*, a weight), measure of weight. The avoirdupois or commercial pound, or 16 oz., is equal to 7,000 gr.; the apothecaries' and the troy pound, of 12 oz., to 5,760 gr.

POUND (Anglo-Saxon, *pund*, a fold), in law, a pen, pinfold, or inclosure of any kind author-

ized by law and belonging to a town, city, or county, in which domestic animals that are wandering about, or trespassing, may be confined until claimed and taken out by the owner, in a lawful way.

Pound'age. See TONNAGE AND POUNDAGE.

Pound Ster'ling, denomination of money, originating from the pound weight of silver, which anciently was divided into 240 parts, called pence. These pence were designated *esterling* (of obscure origin, but probably derived from Easterling, the name given to Baltic and German traders in London), whence the name "sterling," the legal description of the English current coin. The pound sterling is a money of account; the gold coin representing it, called a sovereign, is worth $4.8665 in U. S. coin.

Poussin (pō-săn'), **Nicolas,** 1594–1665; French painter; b. Villers, Normandy; went to Paris at eighteen to study; settled in Rome at thirty and attended the academy of Domenichino; endured great poverty until Cardinal Barberini commissioned him to paint two pictures, "The Death of Germanicus" and "The Capture of Jerusalem." In 1640 he returned to Paris, where he became court painter to Louis XIII; 1642 went back to Rome for his wife, but, as Louis XIII died about this time, Poussin remained in Rome. More than 200 prints have been engraved after his pictures. He had an immense influence in landscape painting.

Pout. See BIB.

Pout'er, breed of pigeons characterized by the great dilatation of the gullet, which can be distended with air until the neck assumes a globular shape. This is simply the swelling of the neck seen during the act of cooing, carried to a greatly exaggerated condition by selection. See PIGEON.

Pow'der. See EXPLOSIVES; GUNPOWDER.

Pow'er, Tyrone, 1797–1841; Irish actor; b. county Waterford; removed to Wales in early life; made his début at the Cardiff Theater; played in the principal cities of England, including London; excelled in the delineation of Irish characters. During his last engagement at the Haymarket Theater his salary was advanced to £150 per week. He made successful tours in the U. S., 1833–35 and 1840–41, and was lost in the steamship *President*.

Power, in law, an authority by which one is enabled to exercise the control of an owner over the property of another. The term is important in real estate law, where powers may be created by deed, will, or other instrument executed by the owner of the land, or they may result from legal proceedings, or be conferred upon officials by statute for the purpose of enforcing some public right or private remedy.

Power of Attor'ney, a written instrument conferring upon one person the power to act for another. It is a deed, or sealed instrument, at common law; but modern statutes frequently dispense with the seal. It ordinarily contains the name of the principal, the name of the agent, a precise statement of the authority conferred, with a declaration that the principal ratifies and confirms all authorized acts of the agent, and the seal and signature of the principal. Often it gives to the agent the power to substitute a third person in his stead. A power of attorney may be revoked, unless the power is coupled with an interest.

Power, Pol'yphase Transmis'sion of, system of transmission of alternating electrical currents. Power may be transmitted by the pumping of water, to be used for water motors. By using great pressure, a large amount of power may be transmitted by a small quantity of water; to carry this small quantity of water small pipes suffice. Similarly, a given amount of power may be transmitted over a small wire carrying a small electric current under high pressure. The fact that the use of high pressures involves more or less risk to life and property makes it expedient to transform the transmitted electrical power so that the inexpert user may be supplied with large current at low pressure. The advantage of alternating current for power transmission lies in the fact that the alternating-current machinery needed for the transformation of a given amount of power from small current and high pressure to large current and low pressure, or vice versa, is simpler and cheaper to construct and to operate than the machinery required to accomplish the same result with constant current, or direct current, as it is called. When the transmitted power is to be used solely for lighting, simple alternating current is entirely satisfactory. When the transmitted power is to be used wholly or in part for motive purposes, simple alternating current is not satisfactory, for the reason that a good self-starting motor using simple alternating current cannot at present be made. The employment of alternating current for motive purposes depends on the use of the so-called *induction motor*. This type of motor needs to be supplied with two or more independent alternating currents transmitted over three or more distinct wires. The use of two or more independent alternating currents in this way is called *polyphase transmission*. When two alternating currents are so used the arrangement is called a *two-phase system*; when three alternating currents are so used the arrangement is called a *three-phase system*.

The plant for long-distance transmission of power by polyphase currents consists of power station, transmission line, and receiving station. The power station is provided with a prime mover, either water or steam, which drives one or more polyphase alternators, and also one or more small direct-current dynamos for exciting the field magnets of the alternators. The alternators furnish large current at low pressure to the step-up transformers, which furnish small current at high pressure to the transmission lines. The step-up transformer may be a combination of single-phase transformers or it may be a two-phase three-phase transformer. At the receiving station the high-pressure polyphase currents from the lines pass through the step-down transformers. These step-down transformers may supply cur-

rent direct to the user at a pressure of a few hundred volts, or to a local distributing system at, say, 2,000 volts, from which individual users are supplied through additional step-down transformers. The alternating currents furnished by these step-down transformers are at once available for glow lamps for the manufacture of calcium carbide and carborundum; in short, for every purpose in which the heating action only of the current is important; and for driving induction motors, synchronous motors, and rotary converters. For arc lamps, street-car service, storage-battery charging, and for chemical manufactures in general the direct current from the rotary converter is used. See ELECTRICITY.

Powers, Hiram, 1805–73; American sculptor; b. Woodstock, Vt.; became a waxwork modeler in Cincinnati; 1835 went to Washington, where he modeled busts; 1837 settled in Florence, Italy, where he remained till his death. In 1838 he produced an ideal statue of Eve, and a year later finished the model of his "Greek Slave." Among other works are the "Fisher Boy," "Il Penseroso," "Proserpine" (a bust), "California," "America," and portrait statues of Washington, Calhoun, and Webster. Of his busts, which comprise the greater part of his works, those of Adams, Jackson, Webster, Calhoun, Chief Justice Marshall, Everett, and Van Buren are striking specimens. His latest ideal productions were "The Last of His Tribe," a statue of an Indian maiden, and a "Head of Jesus Christ."

Powers, Mechan'ical. See MECHANICAL POWERS.

Powhatan', 1550–1618; American Indian sachem; raised himself from the rank of a chieftain to the command of thirty tribes, which numbered about 8,000. His dominions included the country between the James and Patuxent rivers, and in the interior as far as the falls of the chief rivers. When John Smith, according to his own story, was taken prisoner, and was about to be dispatched, Powhatan, through the intervention of his daughter POCAHONTAS, spared his life. The quarrels between Powhatan and the English did not cease until the marriage of his daughter with Rolfe, after which he was their firm friend.

Pow'nall, Thomas, 1722–1805; English statesman; b. Lincoln, England; became secretary to the Commissioners for Trade and Plantations, 1745; went to New Jersey as secretary of that province, 1753; lieutenant governor, 1755; member of colonial congress which met at Albany, 1754, to devise measures of defense against the French; Governor of Massachusetts, 1757–60; S. Carolina, 1760–61; sat in Parliament, where he opposed the policy of the crown toward the American colonies; published "The Administration of the Colonies," "A Topographical Description of the Middle British Colonies," and other works.

Pozzo di Borgo (pŏt'sō dē bōr'gō), **Carlo Andrea** (Count), 1764–1842; Russian diplomatist; b. Corsica; advocate of Ajaccio; member of the French Legislative Assembly, 1791–92; associated with Paoli in governing Corsica under the protection of the English, and on their expulsion, 1796, went to England. In 1798 he went to Vienna to negotiate a coalition against France; 1803 became a councilor of state in Russia; left the Russian service, 1808, on account of the friendly relations between Alexander and Napoleon, but returned to it after the campaign of 1812. His whole influence was exerted to keep Alexander steadfast in the war against France, and to gain Sweden for the allies, in which he succeeded, as well as in securing the active coöperation of England. He attended the Congress of Vienna; became ambassador in Paris; signed the Treaty of Paris, 1815; made count, 1825; and represented Russia in France when the revolution of 1830 broke out; later was ambassador in London till 1839.

Pozzuolana (pŏt-sō-ō-lä'nä), reddish, porous volcanic mineral found near Pozzuoli, S. Italy, in the S. of France, and in Rhenish Prussia near Andernach, where it is called *trass*; is mainly a dehydrized silicate of alumina with other earths and alkalies, formed by the pouring of basaltic lava floods over argillaceous beds, or by similar natural processes. Puzzuolana and trass are used for the preparation of hydraulic cements.

Pozzuoli pŏt-sō-ō'lē), ancient *Puteoli*, town of Italy; on bay of Pozzuoli; 6 m. W. of Naples; celebrated for its antiquities, which include an amphitheater, one of the largest of its kind; several temples, and ruins believed to be those of Cicero's villa. The ancient Puteoli was a Campanian city of Greek origin, which, despite the distance from Rome, virtually constituted its most useful port. It was a great center of trade and a favorite resort, like Baiæ, on the opposite side of the bay. Wars and repeated volcanic eruptions in the twelfth and sixteenth centuries destroyed its importance. Pop. (1901) 16,000.

Prac'tice, in law, form and manner of conducting suits or prosecutions according to the principles and rules governing courts. The term is generally used as excluding the principles and rules of pleading and evidence, and referring to the method and course of bringing matters pleaded to trial and proof and of enforcing judgment. The rules of practice are to a large extent fixed by custom or statute, but the judges of the different courts are very generally intrusted with a large discretionary power of changing them.

Praed, Winthrop Mackworth, 1802–39; English poet; b. London; obtained an unprecedented number of prizes for Greek and English poems; called to the bar, 1829; repeatedly elected to Parliament. His sister, Lady Young, prepared a complete edition of his poetical works, with a memoir by the Rev. Derwent Coleridge.

Prænes'te. See PALESTRINA.

Præ'tor, in ancient Rome, a magistrate created by the Licinian law of 367 B.C. as "lesser colleagues" of the two consuls. In practice, however, the functions of the prætor were quite exclusively judicial. He was obliged to remain in the city, and from this fact was

called the *prætor urbanus*. About the middle of the third century B.C., with the increase of the city's population, an additional prætor was named and given jurisdiction over the foreigners resident at Rome, and hence called the *prætor peregrinus*. See CONSUL.

Præto'rians, Roman bodyguard, named in imitation of the cohort said to have been formed by Scipio Africanus out of his bravest troops. Their number increased during the civil wars, and by Augustus they were established as a separate force, of nine cohorts, each containing 1,000 men. Tiberius assembled them all at Rome in a permanent fortified camp, and Vitellius increased the number of cohorts to sixteen. They received double pay. They became very influential in the imperial succession, and 193 A.D., having assassinated Pertinax, who attempted reforms; they even put the imperial dignity up for sale to the highest bidder. They were increased by Maxentius, but were defeated with him, 312, by Constantine, who suppressed them.

Pragmat'ic Sanc'tion, state ordnance decreed by the monarch or the legislature. The phrase seems to have originated with the Byzantine monarchs, but was early introduced into France, and is now applied to several state decrees which have become historical. I. The ordinance of Louis IX (St. Louis), 1269, by which the liberties of the Gallican Church were established. II. That of Charles VII of France, proclaimed at Bourges 1438, confirming the decrees of the Council of Basel, and thereby authorizing the election of bishops by cathedral chapters, etc. III. The ordinance confirming the decrees of the same council, adopted in Germany, 1439, by the Diet of Mentz. IV. The instrument by which Emperor Charles VI, of the house of Hapsburg, in default of male heirs, endeavored to secure the succession in his Austrian dominions to his heirs of the female line. V. The instrument by which Charles III of Spain, 1759, settled the right of succession to the throne of the Two Sicilies on his third son and his descendants.

Prague (präg), former capital of Bohemia, Austria, now of the Czecho-Slovak republic; 217 m. NNW. of Vienna; consists of five parts—the Alstadt, Neustadt, and Josephstadt on the right of the Maldau, and the Hradschin and Kleinseite on the left—connected by bridges, of which the most remarkable is the Karlsbrücke, built 1358–1503 of stone, 31½ ft. broad, 1,572 ft. long, resting on sixteen arches and adorned with statues. The Alstadt, consisting of narrow, crooked streets lined with tall, quaint old houses; the Neustadt, of a more modern and elegant appearance; and the Josephstadt, the Jewish city, form the business part of Prague; the Hradschin and Kleinseite consist almost exclusively of palaces and public buildings. Here is the imperial castle, one of the largest royal residences in Europe. The Hradschin Palace, formed by the immense palaces of the primate, the ex-Emperor Ferdinand, and Prince Schwarzenberg, extends in front of the castle. On the terrace in the rear of the castle stands the Cathedral of St. Vitus, a Gothic structure, built 1343–85, and containing the tomb of St. Nepomuk, the patron saint of the country, with his monument of solid silver weighing 30 cwt., and a mausoleum of Carrara marble erected by Rudolph II over the Bohemian kings. Prominent buildings of the Kleinseite, the so-called Sachsenhaus, built in the thirteenth century; the gorgeous Church of St. Nicolai, erected 1628 by the Jesuits; the palaces of Waldstein, with beautiful gardens; of Fürstenberg, with large library and picture gallery; of Nostitz, with collection of coins, library, and an art gallery, etc. In the Alstadt is the Church Am Teyn, the old Hussite church, founded 1407, containing the monuments of the Bohemian martyrs, Cyrillus and Methodius, and of the Danish astronomer Tycho Brahe. The university has a library, botanical garden, laboratory, observatory, and the faculties of theology, law, medicine, philosophy (which comprises also languages and history), and the exact sciences; was founded 1348 by Charles IV. Leather, glass, liqueurs, beer, spirits, chemicals, woolens, linens, metal ware, and machinery are manufactured. Prague was founded in the eighth century; has ever since formed the leading center of the Czech community; has several times suffered from sieges and bombardments. In 1866 it was occupied by the Prussians without bloodshed, Pop. (1914, with environs) 541,500. See CZECHO-SLOVAKIA.

Prahu. See PROA.

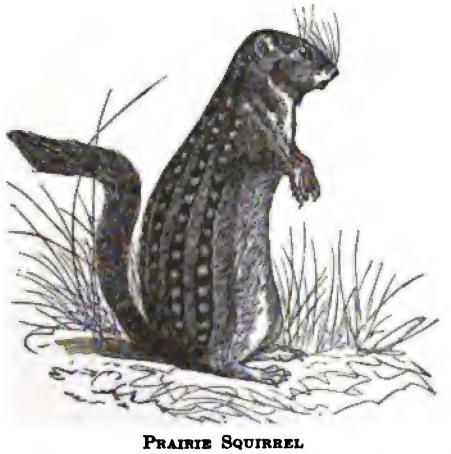
Prai'rie, name applied by the early French explorers to the great fertile, treeless plains of N. America, E. of the arid plains of the W. The region over which they mainly extend is W. Ohio, nearly the whole of Indiana, Illinois, and Iowa, S. Michigan, N. Missouri, and portions of Wisconsin, Kansas, and Nebraska. The elevation within the prairie region varies from 400 to 1,500 ft. On the headwaters of the Illinois and Wabash and S. and W. of Lake Michigan the prairies are very level and smooth, and are termed flat. Those of other regions, where the surface is undulating and broken by the depressions of the streams, are known as rolling prairies. The characteristic herbs of the prairies would seem to be *compositæ*. Trees are met with, under peculiar circumstances of moisture and soil, in scattered groups, called groves, or along the larger streams, or occasionally on low, rocky ridges. The soil is generally free from stones. In the swales and in some of the bottom lands the rich black vegetable mold is very deep, but on the upper prairies its depth is usually from 1 to 2 ft. The subsoil is almost invariably a clayey loam, more or less mixed in its lower portions with sands and occasional pebbles.

Prairie Dog, any rodent of the genus *Cynomys*, a part of the squirrel family, whose members are closely related to the ground or prairie squirrels (*Spermophilus*). Why they were called *dogs* it is difficult to see, for they neither look, act, nor bark like those animals. They are much larger than the squirrels, being generally about a foot in length, exclusive of the tail, which is short and from about 2 to nearly 5 in. in length, according to the species. They inhabit the prairies of W. N. America,

congregate in large numbers, and form communities designated as "villages." They burrow to a considerable distance in the ground, throwing up around the mouths of the burrows hillocks on which they are wont to mount and from thence survey the doings of the community.

PRAIRIE DOG.

Prairie Hen, or Pin'nated Grouse, peculiar form of the grouse family, the *Tympanuchus americanus*, restricted to the U. S. and found chiefly on comparatively open plains and prairies. The species is at once recognizable by the extension of feathers to the lower end of the tarsus, the air bladders, and the long and lanceolate feathers of the sides of the neck, and the short, subtruncate tail. This species ranges from Illinois W. to the foothills of the Rocky Mountains, and formerly abounded, but has been decimated by market gunners. It is replaced in the SW. by *T. pallidicincta*. A very closely related species, *T. cupido*, formerly inhabited portions of the E. parts of the U. S., and in comparatively recent times was common on Long Island, but has now been almost exterminated.



PRAIRIE SQUIRREL

Prairie Squir'rel, any member of the genus *Spermophilus*, of the family *Sciuridæ*, found in various parts of the U. S.; they are simply squirrels frequenting the ground rather than trees, and having a shorter tail than the tree squirrels, and also provided with cheek pouches. They live on the prairie lands of the W. states and territories, make burrows, and generally associate in considerable communities. Eleven species are now recognized as inhabitants of various parts of the U. S.; the best known are the *S. thirteen-lineatus* (striped gopher and prairie squirrel of Illinois, Iowa, and adjacent states) and the *S. franklini* (great gopher of Illinois and corresponding latitudes upward to the Saskatchewan region).

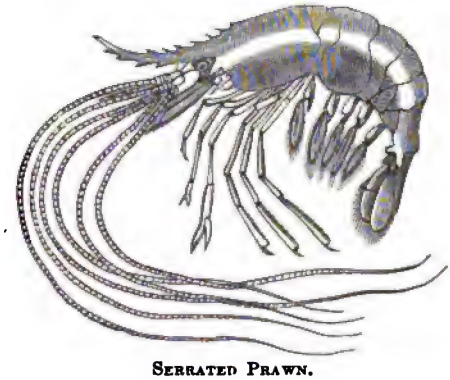
Prase. See QUARTZ.

Prat'inas, of Phlius in the Peloponnesus; Greek poet; flourished toward the end of the sixth century B.C., and is said to have introduced the satyr drama into Athens.

Pratt, Charles. See CAMDEN, CHARLES PRATT, EARL OF.

Pratz, Le Page du, abt. 1690–1775; Dutch colonizer and explorer; b. Holland; entered the French army in youth; engaged in campaigns in Germany; became a member of a French W. land company, which obtained the grant of a tract of land near New Orleans, La.; conducted an expedition thither, 1718; made fruitless efforts at colonization; ascended the Mississippi, 1720, and settled among the Natchez; explored Missouri and Arkansas rivers; returned to France, 1734; published "History of Louisiana."

Prawn, name applied to many of the smaller long-tailed decapod crustaceans, chiefly to those of the *Palæmonidæ* and *Peneidæ*. In Europe and in the tropics they are used as food,



SERRATED PRAWN.

but in the U. S., except in the S. states, they are little used. Some of the species which inhabit the seas of warm climates reach a large size.

Praxiteles (prăks-ĭt'ē-lēz), Greek sculptor of the fourth century B.C.; ranks at the head of the later Attic school; nothing is known of his personal history, except that he was a resident of Athens; was unsurpassed in the exhibition of the softer beauties of the human form; most celebrated work, the Cnidian Venus, so called because it was owned in Cnidus.

Preach'ing Fri'ars. See DOMINICANS.

Pread'amites, men living before the time of Adam; term adopted by various writers to designate the tribes or nations which they believe existed on the earth before the date assigned by the usual scriptural chronology to the appearance of Adam and Eve. Before the investigations of geologists and archæologists in the nineteenth century there was no positive reason for imputing a greater antiquity to the human race than that given in the Book of Genesis, and this was not definitely fixed. The usual date for the creation of Adam given in English works is that derived by Archbishop Usher (abt. 1660) from the Hebrew text, and places it 4,004 years B.C. The calculations of William Hales (abt. 1810) assigned the creation of Adam to 5411 B.C. Still wider variations have been advanced by other competent orthodox scholars, so that it is stated in a publication by the Univ. of Oxford that "not less than 300 different dates have been assigned as the era of the creation, varying in the extremes no less than 3,000 years."

It is entirely consistent with faith in the scriptural narrative to recognize an antiquity of the human race indefinitely greater than that attributed to it in the chronology of Archbishop Usher. The necessity of so doing became apparent when geologists and archæologists discovered in undisturbed deposits of vast antiquity the fragments of human bones and the relics of human industry. These have been exhumed in every continent, showing that at a very remote epoch man was not only living on the earth, but had already wandered widely over its surface. Investigations on the sites of the oldest known cities of the valleys of the Nile and the Euphrates prove beyond question that several of them were founded and were the scenes of a developed civilization long antecedent to the remotest date above mentioned as that of the creation of Adam. The term "preadamites" is no longer regarded as sufficiently accurate for the language of science. It is better to employ the phrase "prehistoric men," meaning those who lived before the recorded dates of any authentic historical narratives.

Preb'end (Latin, *præbere*, to deliver), in ecclesiastical usage, a pensioned office attached to a cathedral or collegiate church, and the emoluments derived from the same. Canons or members of cathedral or conventual chapters were to receive for the singing of the divine office, or some equivalent duty, a stipend, which was called *portio canonica præbenda*. In the English Church, after the Reformation, prebends attached to the cure of souls were given to priests who were not canons; but at present all members of English chapters are styled canons and are provided with prebends.

Preb'le, Edward, 1761–1807; American naval officer; b. Falmouth (now Portland), Me.; 1777 embarked in a privateer, and 1779 entered the provincial navy; was taken prisoner in New York harbor, and on his release served on board the sloop of war *Winthrop*, with which he remained till 1782, greatly distinguishing himself by boarding with four men an armed British brig off Castine, Me., and capturing her under fire. In 1799 he was given command of the *Essex*, and, 1803, of the squadron sent against Tripoli. Arriving at Tangier, he concluded peaceful negotiations with the Sultan of Morocco, after which he proceeded to blockade Tripoli, which he subjected to repeated vigorous bombardments, interrupted by several sharp engagements with the Tripolitan gunboats. He received the thanks of Congress and a gold medal.

Preble, George Henry, 1816–85; American naval officer; b. Portland, Me.; entered the navy, 1835; served in Florida against the Seminoles, and in Mexican War participated in the capture of Alvarado and Tampico; in several actions with Chinese pirates, 1854–55; commanded the *Katahdin* at the taking of New Orleans, 1862, and the fleet brigade in the battles of Honey Hill and De Vaux's Neck, 1864; rear admiral, 1876; retired, 1878; author of "History of the American Flag," "History of Steam Navigation," and other historical works.

Prec'edents, in law, (1) forms of procedure, of conveyancing, and the like, which have been approved by usage or judicial authority, and therefore may be followed safely; (2) decisions of the courts which declare a rule of law susceptible of application to other cases.

Preces'sion of the E'quinoxes, slow regression of the equinoctial points on the plane of the ecliptic. It is so called from its causing the sun to arrive in either equinox a little earlier than he otherwise would. The effect is to increase the longitudes of the fixed stars at the rate of about 50¼″ annually. The discovery of the movement is due to Hipparchus, about 150 B.C. Copernicus was the first to give a true explanation of the phenomenon. Newton discovered its physical cause. This cause is the attraction of the sun, moon, and planets on the spheroidal figure of the earth, giving to the axis a conical motion. The pole of the equator is thus made to shift its place, performing a complete revolution around the pole of the ecliptic in 25,868 years. See ASTRONOMY; EQUINOX; SOLSTICE.

Précieuses (prā-syėz'), name given in France in the seventeenth century to a group of women who cultivated an extreme refinement in speech and manners. They carried to excess the concern for propriety and elegance of expression and of the forms of social intercourse which, centering in the Hôtel de Rambouillet, was doing much to refine French language and society. For a moment the *précieuses* were conspicuous in the salons that imitated the Hôtel de Rambouillet, and even invaded that salon itself, and threatened to impose their jargon on the French language; but good sense, aided materially by the satire of Molière's "Précieuses ridicules," turned them into ridicule.

Pre'cious Stones, mineral substances possessing such beauty and brilliancy of color, hardness, and rarity as to fit them for use in jew-

PRECIOUS AND SEMI-PRECIOUS STONES.

1. Topaz of Saxony
2. Sapphire
3. Topaz (Ural)
4. Topaz
5. Ruby
6. Amethyst
7. Lapis Lazuli
8. Balas Ruby
9. Diamond
10. Turquoise
11. Emerald
12. Chrysoprase
13. Almandine
14. Hyacinth
15. Garnet
16. Opal
17. Tourmaline (N Y)
18. Tourmaline (Ural)
19. Chrysoberyl
20. Beryl
21. Bloodstone

elry or for ornamental purposes. Strictly speaking, the only precious stones are the diamond, ruby, sapphire, and emerald, though the term is often extended to the opal, notwithstanding its lack of hardness, and to the pearl, which is strictly an animal product.

There are other minerals hard enough to scratch quartz, without metallic luster, but generally brilliant and beautiful, such as the chrysoberyl, alexandrite, tourmaline, spinel, zircon, andalusite, aquamarine, and topaz, which are known as semiprecious or "fancy" stones (called *pierres de fantaisie* by the French). Minerals of both these classes, especially when cut and polished, are popularly called gems, but mineralogically only the semiprecious stones are so called, while archæologically the term gem is restricted to engraved stones, such as intaglios and cameos.

The diamond, although the hardest and the most brilliant of the precious stones, does not command the highest price unless it be of a fine red, blue, or green color, all of exceptional rarity. Fine rubies command from five to ten times the price of fine white diamonds. Emeralds rank next in value, and frequently sell for as much as or more than fine diamonds; sapphires for somewhat less; fine cat's-eyes and the alexandrite variety frequently sell for as much as sapphires. The finest Hungarian opals frequently command one half the value of diamonds, but little increase in price with size. The New South Wales, Queensland, and Washington opals sell for less. Ruby spinels of deep rubylike color frequently command a price nearly as great as that of the diamond. The diamond is 10 in hardness; sapphire, 8.9; chrysoberyl or cat's-eye, 8.5; spinel, 8; topaz and aquamarine, 8; emerald and zircon, 7.8; tourmaline, 7.5; garnet, agate-chalcedony, and bloodstone, 7.3; rock crystal, smoky cairngorm, smoky quartz, amethyst, 7; turquoise and opal, 6. To produce the greatest brilliancy the brilliant form of cutting is the best. The most perfect brilliant cut has fifty-eight facets. To heighten the color in a stone, the step, degree, or trap cutting is the best.

The terms "artificial" and "imitation" must not be confounded in speaking of gems or precious stones, the former being of the true material, but produced by art, while the latter are imitations in other materials. Nearly all gems, with the exception of the diamond, have been artificially produced, but, with the exception of the ruby, only in small examples. Rubies have been made, but the Chamber of Commerce of Precious Stones of Paris has decreed that all gems of this kind shall be sold as artificial, and not as precious, stones. Imitation gems comprise (1) what are known as doublets, in which the upper part of the gem is made of garnet, quartz, or other hard stone, below which is cemented glass the color of the stone to be imitated; for instance, an imitation emerald may have its top of garnet or quartz, and the back a green glass. Other kinds are (2) those which are made by heating rock crystal and plunging it in a solution the color of the gem to be imitated; and (3) those made entirely of glass, for which purpose a brilliant glass is employed containing oxide of lead, and known as *paste* or strass. This is colored by small amounts of metallic oxides, according to the tint desired—*e.g.*, oxide of cobalt for blue, oxide of manganese for violet, etc. The beauty of the precious stones is brought out by cutting and polishing, or the correct form of cutting and the angle of the various facets.

The value of precious stones produced in the U. S., 1906, was $295,797; value of importations of diamonds in various conditions, $33,780,501, and pearls, $6,944,899—$40,725,400. See GEMS; JEWELRY.

Precoc'ity, rapid and abnormally early development of the mental powers, sometimes associated with a correspondingly early ripening of the functions of the body. The popular belief that precocious infants are usually destined to early decay of mental and physical powers is well founded, as can be established by abundant proofs; but there are exceptions to the rule. There is a double relationship between ill health and precocity. The former by restraining a child leads to habits of reading and association with older people, and thus to precocity. The latter, by causing a taste for reading and indoor life, tends to engender ill health or disease. Precocious children should be restrained from following their intellectual bent, and their physical culture encouraged.

Predestina'tion, in theology, the doctrine according to which God has foreordained from eternity and unchangeably whatever takes place. It was first defined and debated during the controversy between Pelagius and St. Augustine. In the Roman Catholic Church the Jansenists became the champions of predestination. It was generally adopted by the earliest reformers, but while in the Reformed Church it received a strict and explicit development by Calvin, to which the Arminians opposed a milder explanation, it was for some time entirely given up by the Lutheran Church until Schleiermacher revived it in a mitigated and somewhat mystical form. See CALVINISM; FOREORDINATION.

Pred'icate, in logic, the second term in a proposition; that which is asserted or predicated of a subject. PREDICATE, in grammar, the word or words in a proposition which express what is affirmed of the subject.

Preëmp'tion, act of one belligerent in seizing on the sea and taking, at a price, certain kinds of neutral property, not strictly contraband, intended for importation within the territory of his foe; a forced purchase instead of confiscation. It was a relaxation of the harshness of the doctrine of *occasional contraband.*

Pre'fect, title of many officers and magistrates of ancient Rome. The *præfectus urbi* was the warden of the city, an officer of great dignity and importance, whose duties varied much at different periods. The prætorian prefects commanded the imperial bodyguard. The *præfectus annonæ* was a magistrate who presided over the distribution of public charity. In modern France a prefect is the chief of

police in each department, and a kind of justice of the peace.

Prejeval'sky. See PRJEVALSKY.

Prel'ate, term applicable to all ecclesiastics of high rank, as well as some of the inferior dignitaries of the papal court. Prelates of the Great Mantle are the lowest in rank; those of the Small Mantle, of higher rank. In the Roman Catholic Church they have mostly the title of "monseigneur."

Pre-monstraten'sians, or Nor'bertines, religious order established at Prémontré, near Laon, France, 1120, by St. Norbert (1080–1134). Norbert was a relative of the Emperor Henry V, and held several rich benefices, when suddenly he was converted, and retired from the world to found a new monastic order, which followed the rule of St. Augustine and were in part canons regular. He became Archbishop of Magdeburg, 1127. The order, which had become very powerful and widespread, kept up the primitive vigor of the rule for about 120 years, but began to decline toward the end of the fifteenth century. It was divided about 1573 into two congregations, the Spanish abbeys having a stricter observance. In 1630 the whole order received the stricter rule. It is not very large, but has convents both of monks and nuns, especially in Austria, Belgium, and Holland.

Prence, or Prince, Thomas, 1601–73; American colonial governor; b. England; one of the Leyden Pilgrims; arrived at Plymouth, Mass., 1621; among first settlers at Nansett or Eastham; governor 1634, 1638, and from 1657 to death; distinguished for religious zeal and the promotion of education.

Preposi'tions, a class of words which serve the purpose of defining the relation of a noun word to its governing word in the sentence. Thus in the sentences *he went to it, he went from it, he went for it,* the prepositions *to, from, for* set forth the relation existing between the act of *going* and the thing *it*; similarly in the case of relations between nouns or adjectives and nouns, as *the son of John, ready for use.* In the primitive Indo-European, which was a highly inflected language, these relations were expressed chiefly by the case endings, and prepositions were used only where these relations were not clearly or definitely enough expressed by the case endings. Such is also approximately the condition in the classical Greek and Latin.

Preraph'aelites, body of artists and lovers of fine art, called by themselves the Preraphaelite Brotherhood, and formed in London, 1849; less properly, all those artists and others in England or elsewhere who executed or admired artistic work done in supposed sympathy with the aims of the brotherhood—that is, those who painted minutely and with attention to detail; those who sought an unaccustomed reality of gesture or pose in painting or sculpture; or those who took religious and mystical subjects and tried to give them new interpretations. The Preraphaelite Brotherhood consisted of Dante Gabriel Rossetti, William Michael Rossetti, William Holman Hunt, John Everett Millais, James Collinson, Frederick George Stephens, and Thomas Woolner. According to the latest writers on the subject and biographers of Rossetti, no other persons ever became members of the brotherhood.

Pres'burg. See PRESSBURG.

Pres'byter, title of an officer in the Christian Church, given at first on account of age, length of service, or dignity; was a Jewish Christian name, and came from the synagogue. In the New Testament the words "presbyter" and "bishop" are interchangeable. In each early church there was a board of presbyters. Their duties were to superintend the church order, discipline, and doctrine, to teach, preach, visit the sick, receive strangers, and preside at the meetings. They were appointed by the apostles or their representatives, or may have been elected or nominated by the people. They were ordained with prayer and the laying on of hands.

Presbyte'rian Church, Christian denomination based on a system of government by presbyters. The pastor of a church and its ruling elders constitute the session of the local church and manage its internal affairs. From its decision an appeal may be taken to the presbytery, composed of the pastor and an elder from each of the congregations within its bounds. The synod, to which appeal may be made from the presbytery, is composed of several adjoining presbyteries. The general assembly, composed of representatives from all the presbyteries, may entertain appeals from synods in certain cases, but it can make no constitutional changes without the approval of the presbyteries.

The doctrines of the Church are embodied in the standards adopted by the Westminster Assembly, convened in London, 1643. Their local coloring is Calvinistic. Their principal points are: (1) God in three persons—Father, Son, and Holy Ghost; these three "the same in substance, equal in power and glory." (2) Man morally depraved by nature. (3) Jesus Christ an atoning Savior. (4) Justification by faith in the Redeemer. (5) Regeneration and sanctification by the Holy Ghost. (6) Eternal happiness in the other world for "believers," eternal suffering for the finally impenitent.

The Presbyterian Church became fully established in Scotland, 1560, when the first general assembly was held. Since that period, in fact, the Presbyterian Church in Scotland has held the same relation to the state that the Episcopal Church has held in England since the reign of Henry VIII. It has, however, been divided into groups by subsequent events. In 1843 nearly 500 ministers of the Established Church gave up their "livings" and formed the "Free Church of Scotland." In 1852 and 1876 it absorbed majorities of the Original Seceders and of the Reformed Presbyterians. Negotiations for a union between the United Presbyterian and the Free churches were brought to a successful conclusion, 1900, when the re-

sultant body was constituted as the United Free Church of Scotland. In England the first presbytery was formed at Wandsworth, near London, November 20, 1572. In 1643 the Westminster Assembly of English divines, with four assessors from Scotland, was convened in London by act of Parliament. In 1647 and 1648 the various parts of the doctrinal standards framed by them were adopted by the English and Scottish parliaments. Till the death of Cromwell the Presbyterianism thus defined was nominally, though not actually, the established religion of England.

In Switzerland the Church remains substantially as it was organized by Calvin. In Germany the elements of Presbyterianism still exist in the "Reformed Church." In the Netherlands, Presbyterianism, brought from Switzerland in the time of William, Prince of Orange, found a congenial soil, and at this time four fifths of the Protestants of the Netherlands are Presbyterians. The historic members of this church in France are the Huguenots. In Canada, Presbyterianism was planted in nearly as many different forms as in the U. S., and passed through somewhat similar stages. The several movements for union culminated, 1875, when practically all the Canadian Presbyterian churches were consolidated into one church, bearing the name The Presbyterian Church in Canada.

The Presbyterian Church in the U. S. owes its origin and cast principally to Scotland, although it has spread from three centers—established by the Dutch in New York, by the Scotch in Virginia, and by the Huguenots in Carolina. The first Dutch church was formed in New Amsterdam as early as 1619. Scotch Presbyterians settled on the Elizabeth River, Va., between 1670 and 1680. A Presbyterian church was organized by Francis Makemie at Snow Hill, Md., 1684. The Huguenots, banished from France by the Revocation of the Edict of Nantes, 1685, established their churches in the U. S. at about this period. At the time of the Civil War the presbyteries of the South became distinct, and, notwithstanding overtures looking toward a reunion, so remain, having a large membership and active ministry. The less prominent groups are: (1) The United Presbyterian Church, formed, 1858, by a union of two bodies of Scotch affiliations known as the "Associate" and the "Associate Reformed" churches; (2) the Reformed Presbyterian Church, whose first presbytery was formed 1774; (3) the Associate Reformed, Synod of the South, originally one of the synods of the "Associate Reformed Church," alluded to above; (4) the Cumberland Presbyterian Church, which became a distinct body, 1810, and whose field is principally in the South and Southwest; (5) the Reformed (German) Church, 1819; (6) the Reformed (Dutch) Church, dating from early in the seventeenth century, and having 10,000 adherents when New York was surrendered by the Dutch to the English. All these different groups are practically one in doctrine and polity.

The following table, compiled by Dr. H. K. Carroll for *The Christian Advocate*, summarizes the statistics of 1908 of the Presbyterian bodies in the U. S.:

Bodies.	Ministers.	Churches.	Communicants.
Northern	8,822	10,893	1,312,075
Cumberland	400	424	38,102
Cumberland (Colored)	583	558	42,000
Welsh Calvinistic	80	150	13,020
United	987	960	127,205
Southern	1,606	3,192	262,390
Associate	12	31	1,053
Associate Reformed, South	96	136	12,620
Reformed (Synod)	113	109	9,063
Reformed (General) Synod	23	23	3,500
Reformed (Covenanted)	1	1	40
Reformed in the U. S. and Canada	.....	1	436
Total	12,723	16,478	1,821,504

Pres'cott, William, 1726–95; American army officer; b. Groton, Mass.; brother of Oliver Prescott; in expeditions against Cape Breton, 1754, and Acadia, 1756; commanded regiment of minutemen, 1775; took part in battle of Lexington and commanded at Bunker Hill (according to old reports); resigned from army, 1777, but served as a volunteer against Burgoyne the same year; later several years in legislature.

Prescott, William Hickling, 1796–1859; American historian; b. Salem, Mass.; while at Harvard received injuries which eventually resulted in total blindness in one eye and partial loss of sight in the other; nevertheless, prosecuted historical investigations, aided by a reader, and in writing used an ingeniously contrived frame, the "noctograph"; settled in Boston, 1817; published works comprise "History of the Reign of Ferdinand and Isabella," "History of the Conquest of Mexico," "Biographical and Historical Miscellanies," "The Conquest of Peru," "History of the Reign of Philip the Second," editor of Robertson's "Charles the Fifth."

Prescrip'tion, in law, a title acquired by possession during the time and in the manner fixed by law. The legal principles, first, that the owner of a thing shall remain so until his property is lawfully divested, and, secondly, that he who has been for a long time in possession of a thing shall be regarded as the owner of it, have often led to conflicting claims between owners and possessors. To reconcile such claims, an arbitrary rule has been established in all systems of law, prescribing a time (generally twenty years) within which those who claim to be owners but are not in possession shall prove their rights, and after the lapse of which period possessors who have not been evicted shall be maintained in their possession.

Prescription, in medicine, written formula for the compounding and dispensing of medicines. Previous to the nineteenth century physicians dispensed their remedies, and the prescription was chiefly a record for the guidance of an assistant, who performed the manual work, and for the preservation of valuable or standard curative combinations; but with the separation of the vocations of physician and

apothecary the prescription has become the medium of communication between them. The ingredients of a prescription are commonly designated in Latin; the nomenclature of botany and of chemistry determines the names of vegetable and mineral remedies, and their technical names are the only ones by which they can be definitely known and correctly prepared.

Present'ment, in criminal law, strictly, the act of a grand jury which of its own motion and from its own knowledge, or from evidence placed before it, and without a bill of indictment, makes a written accusation charging some person or persons with the commission of some public offense. At the common law, before criminal proceeding can be instituted against the accused upon this accusation, an indictment must be framed, but in some of the U. S. this rule is modified, and a trial may be had on the presentment.

Preserva'tion of Food, the art of treating articles of food so as to prevent their deterioration and loss through lapse of time. Although applicable to all perishable foods, it is of especial importance in relation to fruit.

Desiccation.—Even a partial appreciation of the nutritive, alterative, and curative properties of fruits, roots, and other vegetable edibles early led to the desire to preserve them for use in seasons when fresh supplies were not procurable. For a long time drying was the only method of preventing them from decaying. Dried dates, packed in bags, under powerful pressure, were used by the Arab in his desert wanderings, just as jerked buffalo, dried in the sun or smoked over the fire, was by the North American Indian. Fruits, vegetables, meat, and fish are now dried in kilns far more rapidly and effectually than by the heat of the sun, the waste by shrinkage being reduced to a minimum, and the very form of the juice cells remaining almost unchanged.

Canning.—In canning the chief agent is heat; the object is to retain as far as practicable the natural character of the article, and to arrest agencies which would, in the natural course of events, cause decay. To effect this, air must be absolutely excluded. The minutest flaw in the can or in the rubber padding of the tightly screwed top will admit bacteria, the presence of which means putrescence. *Pickling.*—Almost every variety of food known to man is prepared and stored for table use by means of spiced vinegar. Green vegetables, liable to spoil by reason of the succulence that is their chief recommendation, must first be made firm. This is done by steeping them in strong brine for a number of days. When sufficiently hard they are transferred to a vessel containing pure, soft water and left for twenty-four hours. Then they are put into a kettle and cold water poured in until the kettle is full, after which the contents are slowly cooked, or steamed, until the vegetables are of a fine green. Finally they are packed in a jar and scalding vinegar, highly spiced, is poured over them.

Corning.—Raw meats and fish are preserved from decomposition by plunging them into and keeping them below the surface of a solution of salt and water strong enough to float an egg. *Curing* is done by suspending flesh or fish that has already undergone pickling in the smoke of smoldering wood, usually hickory or oak, and leaving it thus for an indefinite time, seldom less than a month. *Preserves.*—This term is popularly applied to fruits cooked in sirup in the proportion of a pound of sugar to one of fruit. Under the head of preserves come jams and marmalades, the only difference between these and the conserve proper being that less sugar is needed for jams, and that they and marmalades are stewed down to a smooth paste. In the regular preserve care is taken to retain, as far as may be, the form of the fruit. *Fruit jellies* are made by pressing and straining the juice from the pulp, boiling it clear, and adding a pound of sugar for each pint of scalding liquid, stirring the mixture over the fire until the sugar is dissolved, and filling heated glasses or china jars with it.

Cold Storage.—Extreme cold, by suspending natural processes which would induce decay, has long been recognized as valuable in preserving food. Food of every description, including the most delicate fruits, is transported in refrigerator cars. Hotels have immense storerooms, constructed upon the refrigerator principle, in which fish, poultry, and what is sold as "butcher's meat" may be kept for long periods. See ANTISEPTICS; FOOD.

Preservation of Tim'ber, the act or process of rendering timber more durable. The decay of wood proceeds from agencies both internal and external. *Cellulose,* which forms the great bulk of woody tissue, is by itself a very permanent substance, but when in contact with fermenting or putrefying nitrogenous matters it decomposes, forming humuslike substances that have no coherence. Fermentation or putrefaction cannot take place in the absence of moisture, and hence perfect seasoning of the wood is a powerful preservative. This process, however, takes time and is expensive, being useless, moreover, when the wood is exposed to moisture. It has been found that this internal destructive agency is best counteracted by impregnating with chemical agents, such as solutions of corrosive sublimate, copper sulphate, zinc chloride, creosote oil, carbolic acid, etc. Other internal destructive agencies arise from the eggs of insects deposited in the wood or under the bark. This may be sometimes, though not always, prevented by stripping off the bark, but treatment with agents poisonous to the developing larvæ is surer. External destroying agencies are most powerful when the wood is exposed to simultaneous action of air and moisture, which foster a number of destructive processes. Under sea water, and between high and low tide, the teredo is another destructive agent. In tropical countries ants are enemies of timber structures. Contact with iron also destroys cellulose rapidly, through a slow combustion set up between the carbon of the cellulose and the oxygen of ferric oxide. A species of disintegration called *dry rot* is also caused by the action of some fungi. See FORESTRY; TIMBER.

Pres'ident, in the U. S., the chief magistrate of the nation, chosen by a college of electors

elected by the voters of the several states. The term of office is four years, after which the President may be a candidate for reëlection, but custom and precedent are against electing him for a third term. The office, which was established by the Constitution of 1787, imposes on the incumbent the obligation to see that the laws are faithfully executed, authorizes him to grant pardons and reprieves, to conclude treaties with the concurrence of the Senate, to veto unwise legislative measures, which can then be passed only by a vote of two thirds of each house of Congress, and to appoint officers to administer the laws. He is commander in chief of the army and navy of the U. S., and of the militia of the several states when called into the service of the U. S. On the death, removal, or resignation of the President, the Vice President succeeds him in office. If for any reason both the President and the Vice President are unable to serve, a member of the Cabinet, in the following order, acts as President until the disability is removed or a President is elected: the Secretary of State, Secretary of Treasury, Secretary of War, Attorney-general, Postmaster-general, Secretary of Navy, Secretary of Interior, Secretary of Agriculture, Secretary of Commerce, and Secretary of Labor.

Presiden'tial Elect'oral Commis'sion, commission constituted by act of U. S. Congress, January 29, 1877, to determine questions in dispute concerning the electoral votes of Florida, Louisiana, S. Carolina, and Oregon in the presidential election of 1876; comprised U. S. Senators George F. Edmunds, Oliver P. Morton, Frederick T. Frelinghuysen, Allan G. Thurman, and Thomas F. Bayard; U. S. Representatives Henry B. Payne, Eppa Huntoon, Josiah Abbott, James A. Garfield, and George F. Hoar, and U. S. Supreme Court Justices Nathan Clifford, William Strong, Samuel F. Miller, Stephen J. Field, and Joseph P. Bradley. The commission decided that it was not competent for Congress or the commission to go behind a properly executed electoral certificate and take evidence in support of alleged irregularities before the certificate was issued, and by a party vote of 8 to 7 on each set of certificates decided in favor of the Republican electors, thus giving the Republican candidates 185 votes in the electoral college to 184 for the Democratic candidates, and insuring the election of Rutherford B. Hayes over Samuel J. Tilden.

Preso'va. See EPERIES.

Press'burg (Hungarian, POZSONY), town of Hungary; on the Danube, near the frontier of lower Austria; was the Hungarian capital, 1541–1784, when Joseph II restored that dignity to its former possessor—Buda; has a stately cathedral and an ancient city hall, academy, museum of antiquity and natural history, and numerous educational and philanthropic institutions; manufactures chemicals, leather, and gold and silver ware, and carries on a large trade in grain and wine. Pop. (1900) 65,867; majority Germans.

Press'ing to Death. See PEINE FORTE ET DURE.

Pres'ter John (PRIEST JOHN), semimythical character who figured largely in the geographical romances of the Middle Ages. According to general belief, there was somewhere in the interior of Asia or Africa a kingdom which had been converted from Islam to Christianity, governed by a priest king named John, who was exceedingly anxious to open friendly intercourse with the Church of Rome. During two centuries numerous embassies were sent to central Asia, and even to Abyssinia (1481–95), in search of the lost Christian nation, but the search proved fruitless.

Pres'ton, town in Lancashire, England; on the Ribble; 28 m. NNE. of Liverpool; one of the chief seats of the Lancashire cotton industry. There are also iron and brass foundries, tanneries, ropewalks, glassworks, shipbuilding yards, engineering and machine shops, breweries, and distilleries. The Roman Catholic church, St. Walburge's, has the highest spire (306 ft.) built in England since the Reformation. Near Preston, August 17, 1648, Cromwell totally routed the Royalists. Pop. (1906) 116,400.

Prestonpans', village in Haddington, Scotland, on the Frith of Forth; 8 m. E. of Edinburgh, where was fought a memorable action between the Scottish Jacobites under the Young Pretender, Charles Edward, and the royal troops under Sir John Cope, September 21, 1745. The Royalists had about 2,200 men, with six pieces of artillery, and the insurgents 2,500. The Highlanders surprised the Royalists, attacking at sunrise, and routed them after a brief contest. About 400 of the latter were slain, among them the famous Col. Gardiner, and the Pretender lost about 100 killed and wounded. The battle was called by the Jacobites that of Gladsmuir. On the 22d the Pretender made a triumphal entry into Edinburgh.

Presump'tion, in law, an inference or assumption made in the absence of evidence. Presumptions are conclusive and disputable. The law asserts conclusive presumptions to be true, and will not permit evidence to deny or refute them. A familiar illustration may be found in the rule that a debt which has run twenty years is conclusively presumed to have been paid. Disputable presumptions are little more than legal inferences from existing evidence, open to modification or reversal by further evidence, such as the general presumption that a man is innocent of a crime till he has been proven guilty. The number of presumptions of law is very large, and is constantly being augmented by the process of judicial legislation, as well as by direct legislative act. They play an important part in the due and orderly administration of justice.

Pretend'er, name frequently applied to the Stuart claimant to the British throne after the death of the exiled James II. The Pretenders were the son and grandson of that monarch, lineal heirs to the throne, which they, respectively, attempted to recover by means of the "Jacobite" insurrections in Scotland, 1715

and 1745. See JAMES FRANCIS EDWARD STUART and CHARLES EDWARD.

Preto'ria, capital of the Province of the Transvaal, Union of South Africa; on the Apies, a head stream of the Limpopo; 30 m. NE. of Johannesburg, with which and Cape Town and Lorenzo Marques, on Delagoa Bay, it is connected by rail; elevation, 4,500 ft.; founded 1855 by Pretorius, a Boer leader; has a Parliament house, normal college, several fine public squares, botanical and zoölogical gardens, United Dutch Reformed, Dutch, Anglican, Wesleyan, Roman Catholic, Presbyterian, and other Christian churches and Jewish synagogue, and large trade, promoted by proximity of the Johannesburg gold fields; in Anglo-Boer War was occupied by Lord Roberts, 1900. Pop. (1906), whites, 21,160.

Pre'vious Ques'tion, in parliamentary law, the question whether the main issue shall now be voted on. In the U. S. the motion is made and seconded by supporters of the issue for the purpose of shutting off further debate; they therefore, of course, vote in the affirmative on the previous question itself. In the British Parliament the previous question is brought forward and seconded by opponents of the main issue, who vote against the motion when put for the purpose of preventing the putting of the main question.

Pri'am, son of Laomedon and Strymo, and last King of Troy; original name Podarces, but received name of Priam because he was ransomed by his sister Hesione from Heracles; was the husband of Hecuba, father of Hector, Paris, Polyxena, Cassandra, Deiphobus, Helenus, Troilus, and others. During his reign the Trojan War occurred, which ended with the extinction of his race. Homer's "Iliad" narrates a small portion of the events of the Trojan War.

Pribilof (prē-bē-lŏv') **Is'lands,** group of small volcanic islands in Bering Sea; 192 m. N. of Unalaska. The perfect isolation of these islands, and the mist and fog which prevail, cause the fur seal to select these grounds for the purpose of breeding. The great seal-producing island is St. Paul.

Price, Richard, 1723–91; British philosopher; b. Tynton, Wales; pastor of Presbyterian churches at Hackney and Newington Green, England, after 1756; high authority on vital statistics and political economy; works include "Observations on Reversionary Payments, Annuities, etc."; "Appeal to the Public on the Subject of the National Debt," "The Nature of Civil Liberty," and several pamphlets in which he advocated the claims of the American colonists to an ample redress of grievances.

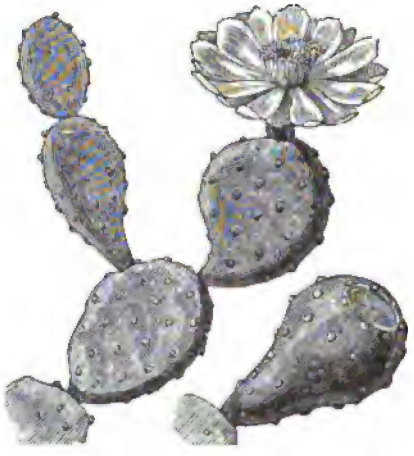
Prick'ly Ash, or Tooth'ache Tree, *Xanthoxylum americanum*; a large prickly shrub, belonging to the *Rutaceæ*; found in most parts of the U. S.; bark aromatic and stimulant, and is used as a remedy for toothache, for rheumatism, and other diseases. *X. carolinianum*, the S. prickly ash, becomes quite a large tree; bark extremely pungent, and armed with curious prickly warts. *X. floridanum* and *X. pterota* grow in Florida. China, Japan, S.

PRICKLY ASH. 1. Pistillate flowers and leaves of the natural size at flowering time. 2. Fruit of natural size. 3. Pistillate flower enlarged. 4. Staminate flower enlarged.

America, and the W. Indies abound in species of this genus.

Prickly Heat, popular name for eruptive skin diseases, occurring in hot weather and characterized by itching and sensations of stinging. Disordered digestion, constipation, and abnormal perspiration are causes. Saline cathartics, soothing lotions containing carbolic acid, camphor, and similar sedatives are useful, and the disease is often avoided by susceptible persons by frequent bathing and protection from the sun's rays.

Prickly Pear, any cactus of the genus *Opuntia*, especially *O. vulgaris*, native of many



PRICKLY PEAR.

places in the U. S. from Massachusetts S. and W.; naturalized extensively in the Old World; fruit smooth and edible, but not so good as

that of *O. ficus indicus*, which is prickly; erect kinds are serviceable hedge plants; one species is the official emblem of Mexico.

Pride, Thomas, d. 1658; English military officer; b. London; served with distinction under Essex in the civil war; by order of a parliamentary council, invaded the House of Commons, December 6, 1848, with an armed force and ejected all members who were in favor of reconciliation with the king; this arbitrary action thenceforth known as "Pride's Purge." He served as one of the judges who condemned Charles I to death.

Priess'nitz, Vincent, 1799–1851; German hydropathist; b. Gräfenberg, Austrian Silesia; inventor of hydropathy, and, 1822, by special authority from the Austrian Govt., founder of the Gräfenberg water cure, which he administered till his death.

Priest, person set apart for religious offices and ceremonies, and in particular for the performance of sacrifice. In earliest times the head of the family was recognized as the fittest person to appear before God; hence came the "patriarchal priesthood." The Mosaic law established three orders—the high priests, the priests, and the Levites—all from the tribe of Levi. Among the most ancient nations, India, Egypt, and the Hebrews, the priesthood was hereditary, and in the two former constituted a distinct class. Among the Hebrews the priests, who must be of Aaronic descent, were only allowed cities necessary for their residence, and were cut off from other inheritance in land. The early history of the priesthood of pagan religions is obscure. With most of the tribes the priest appears as a sorcerer. The Brahmans have assigned to the priest the primacy of honor among the castes, and in their enormous prerogatives embody the idea of a vicegerency of God. The Buddhist priests are essentially spiritual guides, and do not form a caste. The ancient religion of the Greeks had no general priesthood, but only priests of the several deities. The Roman priesthood was charged with the office of divining.

In the Christian system the Gospel represents Christ as the one priest, who for the redemption of the world offered the one sacrifice, that of the cross. The Roman Catholic Church and the Eastern churches maintain that the sacrifice of the cross was to be continued in the Church through appointed representatives, who partake of Christ's priestly character. The other Christian denominations deny that there is any real priest but Christ, and regard the clergy as only teachers and servants of the Church.

In the Anglican Church one must be twenty-four years of age before he can be admitted to the priesthood. According to the tenets of the Roman Catholic Church, once ordained, the priest, though he may be deprived of the right to exercise his office, always retains the essential power of consecrating the body and blood of Christ.

Priest'ley, Joseph, 1733–1804; English philosopher; b. Birstal-Fieldhead, near Leeds; assistant minister to an Independent congregation at Needham-Market, Suffolk, 1755–58; adopted Unitarian views; taught a private school at Nantwich, Suffolk, 1758–61; there wrote his first published work, "The Scripture Doctrine of Remission"; taught languages and literature in an academy at Warrington; made the acquaintance of Dr. Franklin, and at his instance prepared "History and Present State of Electricity, with Original Experiments." He was pastor of Mill Hill Chapel, Leeds, 1767–73; made and published important researches in pneumatics and chemistry; published "Institutes of Natural and Revealed Religion"; librarian to the Earl of Shelburne, 1773–80; made, 1774, the discovery of oxygen, and later of other gases; became, 1780, minister to the principal Independent congregation at Birmingham; wrote various works on Christianity and "Letters to Burke, Occasioned by His Reflections on the Revolution in France," which procured him an honorary citizenship in the French Republic, but caused his house to be sacked by a mob. He was pastor of Gravel Pit Meetinghouse, Hackney, 1791–94; then removed to Northumberland Co., Pa., where his sons had settled, and died there.

Prim, Juan (Count of Reus and Marquis of Castillejos), 1814–70; Spanish military officer; b. Reus, Catalonia; became colonel, 1837; elected to the Cortes; plotted against the government of Espartero; aided materially in effecting the return of Christina; appointed Governor of Porto Rico; commanded reserve division in war against Morocco, 1859–60, gaining great military reputation and title of marquis; commanded Spanish contingent in allied intervention in Mexico, 1861. After return to Spain was accused of complicity in a military conspiracy; banished from Madrid, 1864; devoted himself thenceforth to the overthrow of Isabella; ultimately succeeded in organizing the movement which, September, 1868, resulted in flight of queen to France. He became Minister of War and head of the cabinet in the new provisional government; furnished the pretext for the Franco-German War of 1870–71 by offer of crown of Spain to Prince Leopold of Hohenzollern; obtained from the Cortes the election of the Italian prince Amadeus, Duke of Aosta, 1870; on day new king landed at Barcelona (December 28th) Prim was fatally wounded by assassins in Madrid.

Pri'mary Elec'tions, in U. S. politics, term usually applied to the preliminary meetings of the voters of any political party to nominate candidates for offices to be filled by the people at a subsequent election, or to choose delegates to a convention that will make such nominations. During 1800–24 the presidential candidates of one party at least, and often of both, were designated by members of Congress in a caucus, though in the later years some of the state legislatures also made nominations. In 1828 the presidential candidates were nominated by the state legislatures, and, 1832, the present system of nomination by convention founded on the primaries was started. In large cities these elections, owing to the lack of acquaintance among the voters, afford many

opportunities for fraud and many abuses. To provide a means of identifying voters, local political associations are formed, membership in which is limited to voters pledging support to the regular candidates selected by the central committee. The central committee provides the machinery for registration; it is on its control of the lists of voters and thus of primary elections that the possibility of "boss" domination is based.

In few states are primary elections still considered entirely as voluntary meetings. In an attempt to check their abuses, "primary election laws" have been passed, the most complete of which provide complete regulations for holding primary elections, and impose severe penalties against fraud, bribery, and undue influence. A more recent development is the direct primary, which eliminates the party committee as a nominating board, and opens the nominations directly to the people. In some states direct primaries are required by mandatory statutes, in others by optional statutes.

Preferential voting at primary elections, first introduced in Idaho in 1909, permits the voter to indicate his first and second choices. The candidate receiving a majority of first choices, or, failing this, of first and second choices, is the regular nominee. The presidential preference primary, adopted in Oregon in 1910, was employed in several states in the presidential campaign of 1912. This is a device for giving voters an opportunity to vote directly upon presidential candidates and to instruct delegates to national nominating conventions. Its defect is that the apathy of voters in primary contests gives a well organized minority an opportunity to secure control of the state delegation to the national convention. See BALLOT; CAUCUS; ELECTION; NOMINATION.

Pri'mate, originally, in the ecclesiastical system of the Roman Catholic Church and the Church of England, the first in rank of the archbishops in a country. Thus in England the Archbishop of Canterbury was long primate, but at present the Archbishop of York is styled "Primate of England," while Canterbury takes the higher title of "Primate of All England." The Church of Ireland Archbishop of Dublin has the title "Primate of Ireland," and the Church of Ireland and Roman Catholic archbishops of Armagh are each called "Primate of All Ireland." Five or six French prelates are called primates, but the Archbishop of Lyons is "primate of primates." Again, the Archbishop of Braga is Primate of Portugal, although inferior in rank to the Patriarch of Lisbon.

Primates, order of mammals including man, the monkeys, and the lemurs; includes two suborders—(1) *Anthropoidea,* comprising the families *Hominidæ* (man), *Simiidæ* (the large tailless apes), *Cercopithecidæ* (the Old World monkeys, baboons, etc.), *Cebidæ* (the common New World monkeys), and *Mididæ* (marmosets, etc.); and (2) *Prosimiæ* (lemurs, etc.).

Primaticcio (prē-mä-tēt'chō), **Francesco,** 1490–1570; Italian painter; b. Bologna, of a noble family; from Giulio Romano, at Mantua, learned the art of color and modeling in stucco as a means of decoration; was recommended by Duke Gonzaga to Francis I of France as capable of directing the decoration of Fontainebleau, and went to France, 1531. After nine years, he became superintendent of the king's buildings; held the same post under Henry II, and by Francis II was made commissary in general of all the buildings in the kingdom. He gave the designs for all the statues, fountains, decorations, goldsmiths' work, and of all court pageants. The Louvre contains two of his pictures, which are very rare in Italy.

Prime Num'bers, those whole numbers which cannot be exactly divided by any other whole number except 1. Two numbers are prime with respect to each other when they cannot both be divided by any whole number except 1. Thus 2, 3, 5, etc., are prime numbers; 6 and 25 are prime with respect to each other.

Prim'itive Meth'odists. See METHODISM.

Primitive Wes'leyans. See METHODISM.

Primogen'iture, preference in inheritance which the law accords to the eldest born. The sole and exclusive heirship of the eldest son in the English rule of primogeniture dates back directly only to the complete establishment of the feudal system of land tenure in England after the Norman conquest. On the Continent, however, in the feudal states which were erected on the ruins of the Roman Empire the principle had already completely triumphed. Its obscure origin and the rapidity with which it overran W. Europe at this time constitute one of the puzzles of legal history. The right of the eldest son as a right of succession to property was unknown either to the Greek or the Roman jurisprudence, and the "birthright" of the Hebrew and of the Hindu law, which is sometimes confounded with the rule of primogeniture, was at the most only a recognition of the claim of one of several sons (not necessarily the eldest) to a double portion.

The common law pertaining to primogeniture is that if a man dies seized of real estate of which he had the absolute ownership, without having made any disposition of it by will, the whole descends to his heir at law, who is that one of his representatives who is the eldest male among those who are in the nearest degree of kindred. In case of personal property, the right does not exist. In France primogeniture was abolished, 1789, and since that period the tendency of legislation in all countries except the British Islands has been to its abolition. The rule of primogeniture was introduced, along with the rest of the common law, into the English colonies in America, but the principle has long since been repudiated, by statute or constitutional inhibition, in all of the states as being unsuited to the spirit of their institutions. In the U. S., as also in Canada and the English colonies generally, all descendants of the same degree inherit the real property of their ancestor equally as tenants in common. See FIRST-BORN.

Prim'rose (*prime rose*, from its early flowering), genus of handsome flowering herbs, largely European, of the order *Primulaceæ* and the genus *Primula*. The true primrose is *P. grandiflora* of Europe. *P. officinalis* is the cowslip, of which the polyanthus is a cultivated form, all of these running into many varieties. The bird's-eye primrose (*P. farinosa*) belongs to a humbler division of the genus. This and the related *P. mistassinica* are indigenous

Common Primrose.

also to the N. parts of N. America. *P. auricula*, the parent of the auriculas of the gardens, is a native of S. Europe. The Chinese primrose (*P. sinensis*), now one of the commonest house plants, represents a different section of the genus, to which *P. cortusoides*, a choice Siberian species, also belongs. Two very handsome species which are much thought of are *P. japonica*, from Japan, and *P. parryi*, from the Colorado Rocky Mountains. The evening primroses are species of *Œnothera*, of a wholly different natural order, and took the name from a very superficial likeness of the corolla to that of the true primrose.

Prince, Thomas, 1687–1758; American clergyman and author; b. Sandwich, Mass.; preached in various dissenting churches in England, 1712–16; associate pastor Old South Church, Boston, after 1718; left to the church a large collection of books and manuscripts relating to New England history; manuscripts mostly stolen or destroyed during the British occupancy of city; author of "Account of the First Aurora Borealis," "Earthquakes of New England," "New England Chronology."

Prince, title which sprang from that of the Roman *princeps senatus*, which became the civil title of the Roman emperors, as imperator was their military title, and from them passed to mediæval and modern sovereigns. There are also sovereign rulers who have no higher title than prince. Nobles of the royal blood are in general called princes, whether they officially bear this or some inferior title. In continental Europe there are also princes who are not related to sovereign families (called in Germany *fürst*, and not *prinz*). Strictly, all English nobles of higher rank than viscount are entitled to be styled princes, but in practical use princes of the blood are the only ones so designated.

Prince Ed'ward Is'land (named, 1798, in honor of Edward, Duke of Kent, father of Queen Victoria), island in Gulf of St. Lawrence, constituting, since 1873, the smallest province of Dominion of Canada, also the most densely populated; area, 2,184 sq. m.; pop. (1911) 93,728; capital, Charlottetown; province includes twenty-four minor islands. Northumberland Strait, on the S. and W., separates it from the mainland of Nova Scotia and New Brunswick. The soil is very fertile; surface generally level, with some low hills; climate insular, and therefore not severe. The N. shore is one of the best fishing grounds in N. America. Manufacturing interests are not extensive, but shipbuilding is an important industry. Wheat, oats, barley, rye, potatoes, buckwheat, and garden vegetables are raised. Cattle, horses, swine, sheep, and poultry are bred extensively. The island is divided into three counties — King's, Queen's, and Prince. There are three denominational colleges—Roman Catholic, Anglican, and Wesleyan—all at Charlottetown; leading religious denomination, Roman Catholic. The island (the Ile St. Jean of the French) was discovered by the Cabots, 1497; began to be settled by the French, 1715; came under British rule, 1764.

Prin'ceps, civil title of the Roman emperors, as *imperator* was their military title. How the word first came to be used in this sense is a matter of dispute. Some maintain that it was nothing more than a continuation of the ancient title of *princeps senatus*, and that from its absolute use in the first instance by the senators (as *princeps noster*) it was gradually extended, until Augustus himself made official use of it in this way, and thus established the title as the imperial designation.

Prince Ru'pert, a large harbor and city in embryo at the mouth of the Skeena River, in British Columbia, Canada. The Grand Trunk Pacific Railway plans to make the harbor its Pacific terminus, and to build there a model city. Pop. (1911) 4,184.

Prince Rupert's Drops, glass drops with an elongated, tapering form, made by throwing melted glass into water, so that the surface cools rapidly and presses upon the interior portion. A smart blow on the large end makes no impression, but if the smallest part be picked off the small end, the whole falls into powder, the removal of the smallest part of the surface resulting in the disintegration of the strained interior. They derive their name from the fact that Prince Rupert, a nephew of Charles I, introduced them into England.

Prince's Feath'ers. See Amaranth.

Prince's Is'lands, eight islands in the Marmora at the entrance of the Gulf of Nicomedia. Prinkipo, Chalki, Antigone, and Proti are the chief. Most enchanting in climate and natural scenery, in all ages they have been the favorite

resort of the wealthy and luxurious classes of Constantinople. At Chalki is the chief theological seminary of the Orthodox Church.

Prince'ton, borough in Mercer Co., N. J.; on the Delaware and Raritan Canal; 10 m. NE. of Trenton; on a high ridge, commanding an extensive view of the surrounding country; contains quaint colonial houses and many fine modern residences. The old graveyard has been called "the Westminster of America" because of the eminent persons buried there. Princeton is the seat of Princeton University, the theological seminary of the Presbyterian Church in the U. S. of America (founded 1812), and of Evelyn College, for young women. It is also noted as the scene of a battle in the Revolutionary War which proved the initiative of operations by which the British were driven from the greater part of the two Jerseys. On January 2, 1777, Cornwallis advanced the greater part of his army toward Trenton, intending to attack the Americans on the following day. Washington, learning that only a small force remained at Princeton, made a night march thither, surprised the British at daybreak on January 3d, and routed and dispersed them, inflicting a loss of 100 killed and wounded and of 230 prisoners, and sustaining a loss of less than thirty. Though the forces engaged were small, the result was of great value in encouraging the colonists, who had become disheartened by many reverses. Pop. (1910) 5,136.

Princeton Univer'sity (formerly COLLEGE OF NEW JERSEY), institution of learning at Princeton, N. J.; chartered 1746 by the Colony of New Jersey; held its first sessions in Elizabethtown, Jonathan Dickinson being first president; obtained a charter from Gov. Belcher, 1748; located in Newark, with Aaron Burr as president, 1748–57; returned to Princeton, 1757; had as president during part of 1758 the famous Jonathan Edwards. Its main building was occupied as a barrack by both American and British troops during the Revolutionary War; commencement exercises, 1783, were attended by Washington and the Continental Congress. It had among its presidents John Witherspoon, 1768–94, a signer of the Declaration of Independence; Ashbel Greene, 1812–22; James Carnahan, 1823–54; James McCosh, 1868–88; Francis Landey Patton, 1888–1902, during whose incumbency the institution became Princeton Univ. (1896), and Woodrow Wilson, 1902–1910. Though founded under auspices of the Presbyterian Synod of New York, and till recent times closely connected with the Presbyterian denomination, the institution is nonsectarian. The campus, over 1 sq. m. in extent, contains more than thirty buildings, many of them remarkable for architectural beauty. These include Alexander Hall, used for public exercises, lectures, and university gatherings; Chancellor Greene Library (about 342,000 volumes), Nassau Hall, Physical Science Laboratory, Biological Museum and Laboratory, Marquand Chapel, Art Museum, Halstead Observatory, School of Science Building, Blair Hall and Stafford Little Hall (dormitories), Gymnasium, McCosh Hall. A lofty sundial, a replica of one at Corpus Christi College, Oxford, gift of Sir William Mather, was presented to the university by James Bryce, British Ambassador to the U. S., 1907. The university comprises an academic department, John C. Greene School of Science (1873), Graduate School (1901), two observatories, etc. Number of students about 1,400; productive funds, $2,800,000.

Prin'cipal. See AGENT.

Print'ing and Printing Press'es. PRINTING is a process which is involved in making copies, generally in ink and by pressure, of letterpress or of designs engraved, etched, or drawn on a solid surface. In its most restricted sense it is synonymous with typography, and includes typesetting, electrotyping, stereotyping, etc., and the taking of impressions from the inked surface of the type thus set up, or of plates made from them on presses specially constructed for the purpose; but in a wider sense lithography, engraving, zincography, and embossing books in raised letters for the blind, as well as the reproduction of photographic images by the action of the sun on specially prepared paper, etc., are all included. Letterpress printing, or typography, alone will be treated in this article.

Printing was probably practiced by the Chinese as early as the sixth century, but does not appear to have come into general use until the tenth, since which time their printed literature has become very voluminous. In the original Chinese method, a written sheet of paper is laid face downward on a board of hardwood, to the smooth surface of which the ink is transferred, and then all except the inked lines is cut away, leaving the characters in relief. In printing from this page the workman applies the ink with a brush, then lays the sheet of paper on the plate and passes another soft brush over the back. Movable types of various kinds have been used, but the system of block printing still prevails. The invention of printing by movable types has been claimed for Laurens Coster, of Haarlem; Johann Gutenberg, of Mentz; Johann Faust, or Fust, of Mentz, and Peter Schöffer, the son-in-law of Faust. Dutch authorities have generally held that Coster was the real inventor, and place the date of the invention 1423. German authorities regard Gutenberg as the real inventor. According to them, he practiced the art at Strassburg as early as 1436. In 1450 he entered into partnership with Faust at Mentz; but the partnership being dissolved, 1455, Faust carried on the business by himself, and subsequently in partnership with Schöffer. Gutenberg also appears to have carried on the business of a printer until abt. 1465. In 1456 he completed the printing of the Bible in Latin. The art was conducted secretly at Mentz till 1462, when that city was besieged by Count Adolphus of Nassau, the printing houses were broken up, and the printers scattered themselves into various countries. The art was first practiced in Italy, 1465, at Subiaco, in the Roman territory, and in Rome about four years after. It was introduced into Paris, Milan, and Venice, 1469; into England, at West-

minster, probably 1474, by Caxton; into Barcelona, Spain, 1475, and into various other cities of Europe about the same time. The first printing press in America was set up in Mexico, 1536; then followed Lima, 1586; Cambridge, Mass., 1639; New London, Conn., 1709; Charleston, S. C., 1730; and Newport, R. I., 1732.

In 1041 a Chinese blacksmith cut the most frequently used characters on cubes of porcelain paste, which he then baked until hardened. These, being of different heights and thicknesses, were placed in a kind of cement, pressed down evenly, and printed from; but this process seems not to have extended after his time.

The merit of Gutenberg's invention was largely his superior method of making types by punch, matrix, and mold. When he began his experiments he found already in common use paper, printing ink, engraving in relief, some form of printing press, and the art of printing playing cards and block books. Possibly isolated types were then in use, but they could not be used to profit, because they were not scientifically made and sufficiently exact. The printing press is never mentioned by any early writer as an important factor in the development of the invention. Gutenberg's process of type making has been improved in details, but its elementary principles have not been found susceptible of improvement.

It is interesting to note the peculiarities of the first printed works. An edition consisted of a limited number, for 200 or 300 was then esteemed a large issue. The size was either large or small folio, sometimes quarto. The leaves were without running title, direction word, folios, or paragraphs. The words were printed close together; abbreviations were numerous; the orthography was arbitrary; the sentences were distinguished only by the single or the double point, but subsequently the virgule / was used for the simple pause, answering to our comma. The initial letters at the beginning of a chapter or important division were left blank, to be filled in by hand. In some works the embellishments surrounding the text were illuminated in colors, even gold and silver, and charged with saints, birds, flowers, etc. The printer's name, residence, etc., were either omitted or put at the end. The date was often omitted, sometimes obscurely indicated, or printed either at full length or by numerical letters, and sometimes in several ways together, as "One Thousand cccc. and lxiiii.," etc., but always at the end. A variety of characters was uncommon; as a rule a Gothic letter of the same size was used through the work.

At the present time most books are printed from electrotype plates, made from the type after it is set up and made up into pages. *Imposition* is the method of so arranging the pages that they will be in consecutive order when the sheet or section of a book is folded. The imposition of the octavo (Fig. 1) will illustrate the principle. The pages are adjusted to the required distance apart according to the size of the paper and the margins to be obtained.

The *signature* is a figure or a letter of the alphabet placed at the foot of the first page of every form, or a section or subsection of a form, to denote the order of the sheets, and serves as a guide to the binder. The English generally use for signatures the alphabetical letters, omitting J, V, W, which were not used in the Gothic letters of the early printers; and if the sheets extend beyond Z, the letters are doubled or preceded by a figure. The practice in the U. S. and in most European nations is to use figures, a section to be inset being distinguished by a star after the signature figure. The star shows that that part of the sheet is cut off and placed inside the first part when folded.

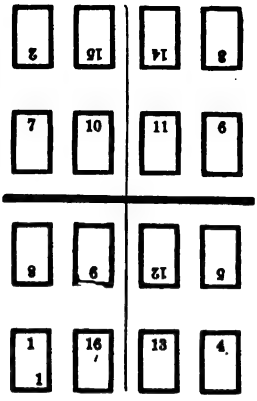


FIG. 1.—IMPOSITION OF THE OCTAVO.

The descriptive names of the sizes of books refer to the size of the leaves, and originated from the number of leaves into which a sheet of paper was folded after printing. Paper is now supplied in any size of sheet, and the size of the page of the book varies accordingly. The book when bound is named according to the nearest size of the regular sheets.

SIZE OF BOOK.	Leaves in a Sheet.	Size of Leaf, Untrimmed, in Inches.
Royal 4to	8	11 × 14
Medium 4to	8	9½ × 12
Imperial 8vo	16	8 × 11½
Super-royal 8vo	16	7 × 10½
Medium 8vo	16	6 × 9½
Crown 8vo	16	5½ × 8½
Medium 12mo	24	5½ × 7½
" 16mo	32	4½ × 6½
" 18mo	36	4 × 6½
" 24mo	48	3½ × 5½
" 32mo	64	3 × 4½

Printing ink is a mechanical mixture of prepared oil and smoke black or other coloring matter. News ink has more of oil and book ink more of black. When properly made it "distributes" or freely spreads out in a very thin film on the inking rollers and the types, is readily transferred to paper by impression, and adheres to it when dry without smearing or fading. In the early days of printing the ink was applied to the type by large leather-coated balls. Each ball was fitted to a handle of wood. Rollers wound with cloth and covered with soft leather were next introduced, but to B. Forster, of England, is due the invention (abt. 1820) of the present roller. These rollers consist of a composition of glue and molasses, boiled together, and molded upon a cylinder of wood incasing an iron rod, which works in a handle or in a proper frame for large presses.

This cylindrical inking roller is rolled over the type, and applies the ink in a quick and even manner. Other compositions have been tried for rollers, but this was preferred for many years on account of its peculiar softness, even retention of the ink, and cheapness. The composition now most approved for its greater durability is a combination of glue, glycerin, and sugar.

FIG. 2.—THE FRANKLIN SCREW-LEVER PRESS.

Paper is usually supplied by the ream of 20 quires of 24 sheets, or 480 sheets per ream, but the paper maker meets the requirements of his customer in this respect. Five hundred and twelve sheets and 516 sheets per ream are often supplied. For the web perfecting press paper is supplied on a roll, a single roll containing the equivalent of 5,000 to 10,000 sheets.

The PRINTING PRESS is a machine for taking impressions from an inked surface on paper, used for books, newspapers, handbills, etc. Gutenberg's press consisted of two upright timbers with crosspieces of wood to stay them together at the top and bottom, and two intermediate cross timbers. On the lower of these the type was supported, and through the other a wooden screw passed, its lower point resting on the center of a flat wooden plate, called the "platen," which was thus screwed down on the type after the latter had been inked and the paper spread over it. The first radical modification was made by Earl Stanhope, who, 1798, invented a press entirely of iron. The form of type was rolled in and out in its bed. The Columbian press, which dispensed with the crew, invented by George Clymer, of Philadelphia, abt. 1817, was the first important American improvement. This was largely superseded by the press of Peter Smith,

FIG. 3.—THE WASHINGTON HAND-PRESS.

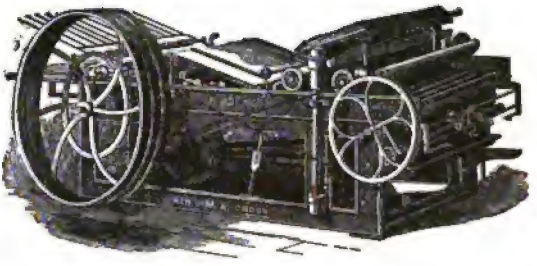


FIG. 4.—THE ADAMS BED-AND-PLATEN PRESS.

1822, and that, 1827, by the Washington press of Samuel Rust. In this the bed slides on a track, and is run in and out under the platen by turning a crank, which has belts attached to a pulley upon its shaft. The impression of the platen is given by means of a bent lever acting on a toggle-joint, and the platen is lifted by springs on either side. Of all the hand presses, this is the only one that has survived.

The "bed-and-platen" system of printing was up to the middle of the nineteenth century the favorite method for fine books and illustrations, and it is still used to some extent. The best press of this description is that devised and patented by Isaac Adams, of Boston, 1830 and 1836, and by Otis Tufts, of same place, 1834. In this type of press the bed, carrying the type or plates, rolls back and forth under the platen. The latter is drawn downward to make the impression by a toggle-joint. These presses have not been made for a number of years, but some are still in use. Abt. 1832 Robert Hoe made the first cylinder press ever used in the U. S. It was the pattern known as the single large cylinder, the cylinder, carrying the paper, making one revolution for each impression in printing, and never stopping. Only a portion of the cylinder was employed to take the impression, the remainder of its circumference being turned down small

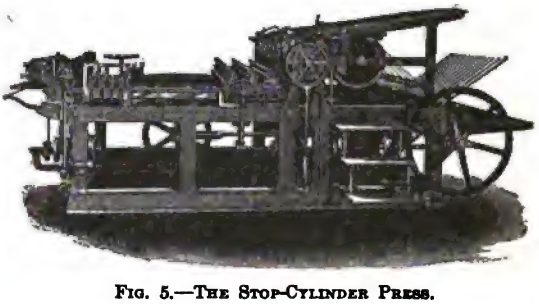


FIG. 5.—THE STOP-CYLINDER PRESS.

enough to allow the type on the bed to pass back under it without touching. This form of press is still in use, with improvements. "Stop-cylinder" presses, devised and patented by Dutarte, a Frenchman, 1852, were later introduced into the U. S. and improved. These have a flat bed, which runs back and forth under a revolving cylinder. The latter revolves in unison with the bed as the impression is made, and stops as the bed returns to the other end of the press. On "two-revolution" cylinder presses, as their name implies, the cylinders make two revolutions for each impression. One revolution prints the sheet, and the other, in the course of which the cylinder is lifted to clear the bed, allows the latter to return. In these types of cylinder presses the sheets are fed to the cylinder, which catches the edge by a set of iron fingers, and in its revolution brings it on the form. The "two-revolution" press is more rapid than the "stop-cylinder." Another form of the cylinder is the "flat-bed perfecting" press. This is essentially two cylinder presses joined in one, printing first on one side of the sheet of paper and then "backing up" on the other.

In the bed-and-platen presses both the printing surface and the impression-surface are flat; in the cylinder press the printing surface is flat and the impression surface curved. The latest great advance in press making is marked by the rotary press, in which both printing surface and impression surface are curved. In one type individual sheets are printed; in another the paper is fed from a roll carrying a continuous "web" of paper. The electrotype plates are curved to fit the printing cylinder. Most magazines are printed in large part upon rotary presses which print both sides of the sheet and deliver the signatures folded. The rotary press is very rapid in its operation, but it is not used as yet for the finest book or magazine work. Newspapers are printed upon rapid rotary perfecting presses with a large number of printing cylinders and impression cylinders. These presses deliver the papers folded, pasted, and counted.

The speed at which presses are run depends upon the size and character of the press and the quality of work desired. Stop-cylinder presses of medium size run at the rate of 1,400 to 1,500 impressions per hour, and two-revolution presses at 1,700 to 1,800 an hour; flat-bed perfecting presses deliver 1,200 to 1,400 perfected sheets per hour. R. Hoe & Co. have made a "double octuple" newspaper press which runs at the rate of 20,000 revolutions per hour of the cylinder, and delivering 320,000 four-, six-, or eight-page papers, folded, counted, and pasted (Fig. 6).

The sheets of paper are fed to the press largely by hand, but much use is made of mechanical "feeders." These operate by various applications of pressure, and are so contrived as to feed the sheets one by one. The ink is applied to the printing surface by means of composition rollers, which distribute a thin film of ink over the plates or type. Various types of small presses are used for printing circulars, etc. These are of the bed-and-platen variety. See ELECTROTYPING; LITHOGRAPHY; TYPE AND TYPESETTING.

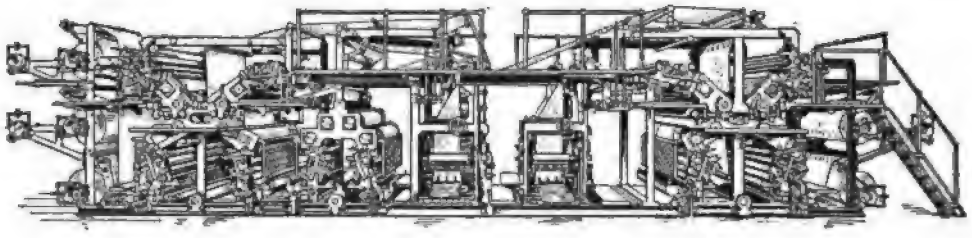


FIG. 6.—NEWSPAPER PRESS.

Pri'or, Matthew, 1664–1721; poet and diplomatist; b. Wimborne-Minster, Dorsetshire, England. He was educated at Cambridge, where he formed an intimacy with Charles Montagu, afterwards Earl of Halifax, and with him wrote a poem, "The City Mouse and Country Mouse" (1687), intended as a travesty upon Dryden's "Hind and Panther." Introduced at court by his patron, Prior became a favorite with William III; was secretary of the commissioners who concluded the Treaty of Ryswick, 1697; secretary of embassy at Paris, 1698; Under Secretary of State, 1699; commissioner of trade, 1700, in which year he published his "Carmen Seculare," in praise of King William; entered Parliament, 1701; became soon afterwards a vehement Tory; was sent to Paris with Bolingbroke, 1711, to make private proposals for peace; was charged with treason for his conduct in this negotiation on the accession of the Whigs to power in 1714; and was imprisoned two years in his own house, during which time he wrote "Alma, or the Progress of the Mind." His collected poems were first published in 1709. He excelled in epigram, society verse, and the short humorous fable.

Prisc'ian, surnamed CÆSARIENSIS, probably because he was born at Cæsarea; the most celebrated Latin grammarian; flourished abt. 500 A.D., and was a teacher of Latin at Constantinople, where he received a salary from the court. The first sixteen books of his "Commentariorum Grammaticorum Libri XVIII" treat upon the eight parts of speech recognized by the ancient grammarians, and the last two on syntax. Other works extant are a grammatical catechism on parts of the "Æneid," a treatise on the symbols used to denote numbers and weights, an essay on accents, another on the meters of Terence, etc.,

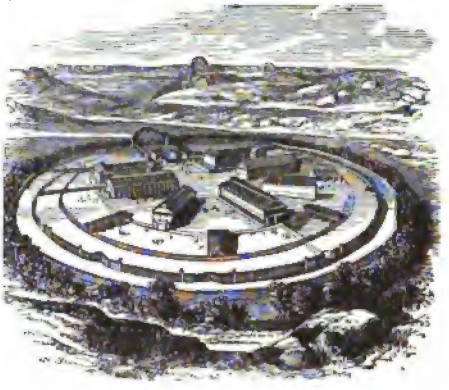
and two poems, "De Laude Anastasii imperatoris," written abt. 512, and "Periegesis," both in hexameters.

Priscil'lian, Bishop of Avila, in Spain; belonged to a noble Spanish family; founded a sect whose doctrines were a blending of Manichæism and Gnosticism. In 379 the existence of the sect became known, and in 380 the Council of Saragossa condemned its doctrines and excommunicated its founder. The influence of Priscillian was too powerful, however, and his most zealous adversary, Bishop Ithacius of Ossonoba, was compelled to fly. He sought refuge with the usurper Maximus, who had Priscillian brought to trial before the Council of Treves, condemned, and put to death in 385. It was the first instance of a Christian being put to death for heresy, and it aroused the indignation of St. Martin of Tours, St. Ambrose, and others. The sect spread subsequently from N. Spain to Languedoc, and even into N. Italy, but disappeared entirely in the sixth century, after the second synod of Braga in 563. Up to 1885 it was supposed that no works of Priscillian had been preserved, but in that year G. Schepss discovered in a Würzburg MS. eleven tractates, which he proved to be by Priscillian.

Prism, a polyhedron two of whose faces are equal polygons, having their sides parallel and all the remaining faces parallelograms. The first-named faces are called bases, and the remaining ones make up what is called the lateral surface of the prism. The distance between the bases is the altitude of the prism.

Pris'on, primarily a place of detention for debtors or persons charged with political or other crimes until they were tried or adjudged guilty or innocent of the offenses for which they were committed; later, the prison has become, to some extent, the place and instrument of punishment. Detention of debtors and of political and other offenders of Egypt and Palestine was very early an admitted necessity. The earliest instances of its use are found among the Egyptians, who devised measures of police of which other nations had not yet felt the want. There are numerous references to prisons in the Old Testament, but always as a place of detention simply. Among the Greeks and Romans the prison was generally only a place of detention. By the laws of Rome, a Roman citizen could not be cast into prison except by the direct command of the emperor. The usual method of detention for a Roman citizen was to chain his right arm to the left arm of a soldier. There were houses of detention in Rome which were used for the safe-keeping of slaves.

The prisons of the Inquisition in Italy, Spain, Portugal, France, Belgium, and Austria were not in the main intended so much for punishment as for detention—the punishment (often within the prison walls) consisting mainly in the racks, wheels, boots, thumbscrews, and other instruments of torture. On the Continent, and even in Great Britain, the idea of imprisonment, except in the case of political offenders, as constituting any part of the punishment of crime does not seem to have been recognized. There were jails, houses of detention, and prisons both in Great Britain and on the Continent, but they were filled with debtors, persons arrested for crime and awaiting trial, and those who had been sentenced to banishment or transportation, to slavery, to the galleys, or to execution. Attempts were made to reform and improve the jails in England, as well as on the Continent, by John Howard in the latter part of the eighteenth century. Beccaria in Italy, and Sir William Blackstone, Jeremy Bentham, and Mr. Eden in Great Britain, took up the work and went forward with



DARTMOOR PRISON.

it. After a conflict of nearly thirty years the prisons and prison systems of Great Britain and Ireland were very thoroughly reformed; transportation ceased, and the convict prisons, though more expensive than they should be, are well managed, and many of their prisoners are reformed. Many of the convicts are employed in the great naval shipyard at Dartmouth and Portsmouth. The jails are cleanly, well ventilated, and for the most part have some employment for the prisoners, which keeps them from mischief and contributes a small sum toward the expense of their support. The reformatories for young offenders have, by reforming the young criminals, prevented the increase of criminal class, and greatly diminished the number and magnitude of crimes in the kingdom.

In the U. S. transportation has never been attempted as a means of ridding the community of the dangerous classes. Before the Revolutionary War the criminal code was very severe; death was the penalty of a great number of crimes. At the same time the prisons were in a wretched condition, hardly better than those in Great Britain. In 1786 Pennsylvania made the first effort at improvement of her prisons by the adoption of the solitary plan of discipline. Reforms were accomplished in Boston by the Prison Discipline Society, which existed from 1824 to 1844. The Prison Association of New York was organized in 1844. In 1821-23 the "congregated or silent system" (now known as the Auburn system) was adopted at Auburn, N. Y., and soon attained such a reputation that it was adopted by other states, and with various modifications is now the prevalent system in the U. S. In

many of the congregated prisons the labor of the prisoners is let to contractors at a given sum per day; in several of the states the entire expenses of the prison are thus defrayed, and in some a surplus is paid into the state treasury. In some cases the state employs the convicts and disposes of the products of their labors, but these generally fail to defray the entire expenses. Many objections have been made to the contracting of the labor of prisoners, and in several states it has been superseded by what is known as the "piece price" and "state account" systems.

There are three recognized systems of prison discipline, *viz.*, the Auburn, or congregate silent system; the Philadelphia, or separate cell system; and the system of progressive classification—sometimes called the Irish system, sometimes the Crofton system. The essential principle of the Auburn system is that of absolute separation of the prisoners by night and associated silent labor by day. This system is almost universal in the U. S., and has also a foothold in various European countries. The essential principle of the separate-cell system is that of a complete bodily separation of the prisoners in labor, recreation, and rest. The Crofton system may be described as an adult reformatory with separation from other prisoners at night and associated labor by day, in which the principle of progressive classification is applied with a gradual lifting of restraint and enlargement of privilege. See JAIL.

Prison Dis'cipline. See PRISON.

Privateer', an armed private vessel which bears the commission of a state to cruise against the commerce of its enemy. The universal practice of nations condemns all authorized hostilities; but the sovereign may avail himself of the private vessels of his subjects by commissioning them to seize the merchant ships of the enemy. These commissioned private ships are in naval warfare much the same as the volunteer corp in the land service. On the sea, however, the letters of marque give that interest in the prize which is the inducement to engage in the service. For, primarily, all prizes rest in the state, and it is the commission alone which, under the municipal regulations of each state, defines the proportion of the captured property and the rewards which fall to the privateersman. There are two kinds of privateering, one in which the citizens of one of the states at war sail under their own flag against the enemy, and another and more odious form in which a neutral accepts a commission from one of two belligerents. Here the legitimacy of the practice is not so clear, at least so far as affects the neutral. Indeed, by conventions and treaties, and by municipal statutes, this latter species of privateering seems to be wellnigh repressed; but the other is not yet entirely so.

In 1856 the states represented in the congress which convened at Paris after the Crimean War made mutual engagements to surrender the practice of privateering. The U. S., however, would not consent to surrender it unless the treaty also provided for the abolition of all war against private property on the ocean, except contraband. The other powers refused to agree to such a provision, and finally in 1861 the U. S. Govt. offered to assent to the Declaration of Paris without the proposed amendment; but this was declined by England and France if it was sought to be made applicable to the Confederate States. Privateers were not employed by either North or South in the Civil War, the Confederate ships commonly called privateers being really commissioned men-of-war, though in some cases illegally fitted out. In 1898, after the U. S. Congress declared war against Spain, Pres. McKinley, in proclaiming the event, announced that the Government would not resort to privateering, but would adhere to the rules of the Declaration of Paris. Spain reserved the right to sanction privateering, but there was no opportunity for it. See PIRACY.

Priv'et, *Ligustrum vulgare*, European shrub of the olive family, now naturalized in the U. S.; chiefly used as a hedge plant, both in the Old and New Worlds; makes a close, handsome hedge, not thorny. Its wood, though

PRIVET.

small, is saved for turners' use in Europe, and its berries yield a pink coloring matter. There are several rather ornamental allied species, one of which, *L. japonicum*, is known popularly as the California privet.

Priv'ilege. See CITIZEN.

Priv'y Coun'cil, in English law, the chief council of the sovereign, consisting of persons chosen at his or her pleasure; now confined to advising the sovereign in the discharge of executive, legislative, and judicial duties; functions exercised by committees or boards; most powerful and the one that has absorbed the most important privileges of the ancient privy council, the cabinet. The members composing the privy council fall into three groups. Members of the cabinet must necessarily be made members, as the confidential advisers of the crown. Beyond these there are great offices which, though unconnected with politics, are usually associated with a place on the council board. Beyond these, again, is a group of per-

sons eminent in political life or in the service of the crown, upon whom the rank of privy councilor is conferred as a complimentary distinction.

Privy Seal, minor seal of the British Govt., affixed to papers of minor importance, and also to important documents preparatory to the affixing of the great seal. The privy seal is in the care of a great officer of state, usually one of the cabinet, called the lord privy seal.

Prize and Prize Mon'ey, something taken on the sea, as belonging to an enemy in war or to a neutral—*i.e.*, to a person resident in a neutral state who is identified with such enemy and the proceeds of its sale. A vessel of a nation taken by its own cruisers, if engaged in illegal trade, may also be called a prize. A prize can become the property of the captor only after trial and condemnation by a competent court. This will be the prize court of the state to which the captor belongs. In the U. S. admiralty cases are tried by the U. S. district courts, with appeal to the Supreme Court. Revised Statutes of the U. S. provide that the net proceeds of all property condemned as prize shall, when the prize was of superior or equal force to the vessel or vessels making the capture, be decreed to the captors; and when of inferior force, half shall be decreed to the U. S. and half to the captors; except that, in case of privateers and letters of marque, the whole shall be decreed to the captors, unless it shall be otherwise provided in the commissions issued to such vessels. There are further provisions as to the proportions in which the prize money shall be distributed.

Prjeval'sky, or Prejevalsky, Nicolai Michaelovitch, 1839–88; Russian explorer; b. government of Smolensk; entered the army, 1855; geographical explorer of the Ussuri country, E. Siberia, 1867–69; traveled in W. China, 1870–73; explored Lob-Nor and the Altyn Tagh Mountains, 1876–77; crossed into Tibet, 1879, but was turned back before Lhassa was reached; again explored the desert of Gobi, the sources of the Hwango-ho and the Lob-Nor district, and again unsuccessfully attempted to reach Lhassa, 1883–85; later commanded a large force with instructions to reach Lhassa at all hazards, but died before the expedition was fully organized. His geographical work was recognized by many honors received from geographical societies and others throughout the world.

Pro'a, or Pra'hu, canoelike sailing vessel of the Malays, Ladrone islanders, etc.; lee side straight and flat from stem to stern, other rounded; both ends alike; carries a lug sail of matting; framework projects to windward, and counterbalances the effect of the wind on the sail, which would otherwise upset the craft; commonly some 30 ft. long and rapid sailer.

Probabil'ity, The'ory of, application of mathematical reasoning to the art of judging in cases where only probable evidence can be obtained. Suppose a die to have two of its six sides painted black, the remaining four being left white, and a person to be required to judge whether, on the die being thrown, a white or a black side will be uppermost. Common sense will teach him to guess the white side, and in common language the chances would be two to one in favor of white. In mathematical language a slightly different expression is used, the probability of an event being a proper fraction, of which the denominator is the entire possible number of chances or cases, while the numerator is the number of those cases which favor the proposed event. In the case just supposed, for instance, there are six sides to the die, of which one and one only must be thrown. Four of these sides being white, the probability of white being thrown is $\frac{4}{6}=\frac{2}{3}$, and that of black is $\frac{2}{6}=\frac{1}{3}$. If one of the four white sides were painted yellow, the probabilities would be white $\frac{1}{2}$, black $\frac{1}{3}$, yellow $\frac{1}{6}$.

By the same principle, if the concurrence of a large number of circumstances is necessary to the production of an event, each of these circumstances may be, in itself, very probable, and yet their concurrence, and consequently the event itself, very improbable. The mathematical rule for determining probability in such a case is that the probability of the concurrence of all the events is equal to the continued product of the probabilities of all the separate events. Suppose that a law requiring the concurrence of the two Houses of Congress and the President were as likely as not to be rejected by any one of them, and that each one of the three authorities formed his own opinion independent of the other two. Then the probability of each authority approving the law being $\frac{1}{2}$, the probability of its passing all three would be $\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}=\frac{1}{8}$. We can get at the same result in this way: Out of 8 laws introduced into the House only 4 would pass and go to the Senate. Out of these 4 the Senate would pass 2, and of these 2 the President would approve 1.

Pro'bate, in law, the proof, before the competent authority, that an instrument offered purporting to be the last will and testament of a person deceased is indeed his lawful act. Until 1857 the custody of the estates of all deceased persons in England vested primarily in the ordinaries or bishops of dioceses, subject only to the exceptional rights of the crown or of lords in respect to certain manors. Authority over all testamentary causes is now vested in the sovereign, and is exercised in the Court of Probate. Ecclesiastical courts never existed in the U. S.; but the office and functions of the English ordinaries have been exercised here by similar officers under various titles, such as surrogate, register of wills, judge of probate, and ordinary, and generally with larger powers than those functionaries possessed. In some states the county courts, and in others the orphans' courts, grant letters of probate. The general rule by statute is that no rule is effectual to pass either real or personal estate unless it has been duly proved and allowed in the probate court; and so long as the probate remains unreversed on appeal, the due execution of the will, the sanity or capacity of the testator, and the attestation of the witnesses, cannot be called in question in the courts of

common law. Proof is made when all persons whose interests are to be affected by the will have been duly notified to be present, and have had opportunity to be heard in the premises. This is now the usual mode of proof in the U. S.

Proboscid'ea, order of mammals distinguished by the extension of the nose into a proboscis and the columnar form of the legs and feet, and typified by the elephants of the present epoch. The placenta is deciduate and zonary; the incisors variable in number, but always with persistent pulps and developed as long tusks curved outward; the carpal bones in two regular rows are broad and short; the toes are five to each foot, and incased in shallow hoofs.

Probus, Marcus Aurelius, abt. 230–282 A.D.; Roman emperor; b. Sirmium, Pannonia; commanded successively the Third and Tenth legions; served in Africa and Pontus, on the Rhine, the Danube, the Euphrates, and the Nile; under Aurelian reconquered Egypt; Emperor Tacitus made him commander in chief in the E. provinces. On the death of Tacitus, 276, the armies of the East forced him to assume the imperial purple. He recovered seventy towns from the Germans, destroyed 400,000 of the invaders, built a stone wall from the Danube to the Rhine, nearly 200 m. long; secured the frontier of Rhætia, and crushed the power of the Sarmatians. To maintain the discipline of his troops, he employed them in active labor. This system irritated the soldiers, and led to an insurrection in his camp near Sirmium, in which he was killed.

Probus, Marcus Valerius, most distinguished of Roman grammarians bearing the name of Probus. Going from Berytus (now Beirut), he taught in Rome in the latter half of the twelfth century A.D., and edited, after the manner of the Alexandrine grammarians, the text of Horace, Vergil, Lucretius, Terence, Persius, and probably other writers. The "Commentary" to the "Eclogues and Georgics" of Vergil, still extant, under his name, is of later date, as are several grammatical treatises bearing the name of Probus.

Proce'dure, in the usage of modern legal writers, all the formal steps and proceedings in the conduct of a judicial controversy as established by the legal rules which control their use.

Proc'ess, in law, a generic term primarily used to designate all the means by which a defendant is compelled to appear and answer to an action brought against him (*original process*), the means of enforcing the judgment therein recovered against him, and also the means by which his property is secured or taken in satisfaction of such judgment (*final process*); and also various other judicial writs or orders issued pending the suit or action upon collateral or interlocutory matter, as to summon witnesses, juries, etc. (*mesne process*). In the criminal procedure it denotes the warrants or other writings authorizing and directing the arrest of persons charged with offenses. In a more general sense it embraces all judicial writs commanding public officers or private individuals to do a specified act; and, finally, it is used, although not technically, as synonymous with "proceeding."

Proclama'tion of Emancipa'tion. See EMANCIPATION.

Pro'clus, 412–485; Greek philosopher; b. Byzantium; became a celebrated teacher in Athens; was the last member of the Neoplatonic school who acquired any celebrity; labored hard to make converts from Christianity. There is no complete edition of his works extant. That by Cousin (six volumes, Paris, 1820–27) contains the treatises on "Providence and Fate," the "Ten Doubts About Providence," the "Nature of Evil," and the commentaries on the "Alcibiades" and "Parmenides."

Proc'ne. See PHILOMELE.

Procon'sul, magistrate in the ancient Roman government who exercised consular authority over a province or an army, but not over Rome; in many cases was a consul, who, after the expiration of his term of service, was sent to control a province; but sometimes the proconsul was not even of consular rank. See CONSUL; PROCURATOR.

Proco'pius, abt. 500–565 A.D.; Byzantine historian; b. Cæsarea, Palestine; distinguished as an advocate at Constantinople; secretary to Belisarius in his wars against the Persians, Vandals, and Goths; returning to Constantinople abt. 542, received from Justinian the title of *illustris* and the position of senator, and, 562, was made prefect of the city. His most important work is the "History" of his own times, in eight books.

Procopius, Andrew (surnamed THE GREAT), abt. 1380–1434; Bohemian general; became a priest, captain in the Hussite army, and, 1424, on the death of Ziska, leader of the Taborites. Procopius the Small joined him, 1427, and the concentration against them of German forces led to a general confederation of the various Hussite parties under his banner. He defeated the Germans, and in several campaigns ravaged a great part of Germany. In 1433 he defended his creed at the Council of Basel, where concessions were made acceptable to the Calixtines, but not to the Taborites. Procopius turned his arms against the Calixtines, and in the decisive battle of Böhmisch-Brod, May 30, 1434, was defeated and, with Procopius the Small, killed.

Procrus'tes, surname commonly given to the famous robber Polypemon or Damastes, who used to place all persons that fell into his hands on an iron bed, and cut off or stretch out their limbs until they fitted the bed. He was slain by Theseus near the Cephissus, in Attica.

Proc'ter, Bryan Waller (pen name BARRY CORNWALL), 1787–1874; English poet; b. London; admitted to bar, 1831; for many years commissioner of lunacy; author of "Dramatic Scenes and Other Poems," "Mirandola," a tragedy, successfully performed; "English Songs

and Lyrics," on which his reputation rests, etc. His daughter, ADELAIDE ANN PROCTER (1825–64), wrote two volumes of verse, "Legends and Lyrics."

Proctor, Richard Anthony, 1837–88; Anglo-American astronomer; b. London; settled in St. Louis, Mo., 1881; in Orange Lake, Fla., 1887; died suddenly in New York City while on his way to fill a lecture engagement in London; was a prodigious worker, exceedingly popular lecturer, and prolific author, his publications comprising valuable works on astronomy and mathematics.

Proctor (Latin, *procurator*, agent), in a general sense, one who is commissioned to manage the business of another. In a particular sense, a proctor is one who in the ecclesiastical or admiralty courts discharges functions similar to those of attorneys and solicitors in other courts. In England and the U. S. certain university officers, whose duty is to guard morals and order, are called proctors.

Procura'tor, designation of a Roman administrative officer, charged with the management of the revenues and business affairs of a province. Although not of military rank, troops were assigned to him for the administration of his office, and he was recognized as second in authority to the governor. He might, therefore, in the absence of his superior or during temporary vacancy of the governorship, assume entire charge of a province, or he might be put at the head of a whole district in a province too large to be governed by one person. See PROCONSUL.

Prof'its, excess of earnings above expenses. In order to ascertain the real profit of an enterprise, *depreciation* of capital must be counted as an expense. Thus if the gross earnings of a business are $10,000 a year, and the current expenses $6,000, the apparent profit is $4,000, but if the invested capital is worth $1,000 less at the end of the year than it was at the beginning, the real profit is only $3,000. It is a disputed question whether taxes should be deducted from earnings before estimating profits. There is another and narrower sense of the word under which interest is deducted before estimating profits. Thus, in the case supposed, if the capital invested is $20,000 and the current rate of interest 5 per cent, there is an interest account, actual or nominal, of $1,000 a year, and the net profit on this basis of reckoning is only $2,000 instead of $3,000. Profits in this sense represent the earnings of management as distinct from those of capital, and will vary according to the business ability of the man in control. It is hard to make an accurate distinction between profits and rent. In general, the former term is applied to income from personal property and the latter to income from real estate.

Profit Shar'ing, name generally given to a modification of the wages system under which a share in the realized profits of the year's business is given to the employee, in addition to his wages already received. This bonus may be definitely determined at the beginning of the year, as when a firm promises to give ten per cent of its net profits to its men, or the percentage may be left to be determined at the end of the twelve months. The essential features of any such scheme are that the firm shall make known its intention at the beginning of the period, and that the sum allotted to each employee, usually on the basis of his wages, shall not be trifling. Profit sharing is not put forth by its wiser advocates as a panacea for industrial troubles, but as a modification of the wages system, applicable in many quarters with good results to both parties to the labor contract. There are two societies devoted to the extension of profit sharing—the French society and the American association. See COÖPERATION.

Prog'nathism, condition of having projecting jaws or a large craniofacial angle, as in negroes.

Progres'sion, in mathematics, a series in which each term is derived from the preceding by a uniform law.

An *arithmetical progression* is a series in which each term is formed from the preceding one by the addition of a constant quantity called the *common difference*. If the common difference is *positive*, each term is greater than the preceding, and the progression is *increasing*; if the common difference is *negative*, each term is less than the preceding, and the progression is *decreasing*. Every increasing progression when taken in a reverse order becomes a decreasing progression, and *vice versa*. An arithmetical progression is said to be *given* when we know one term and the common difference: thus if one term is 9 and the common difference 5, we have, by the continued addition of 5, the series 9, 14, 19, 24, etc.; in like manner, by the continued subtraction of 5, we have the series 9, 4, — 1, — 6, etc. These two series written in proper order form a single progression, as follows:

$$\ldots, -6, -1, 4, 9, 14, 19, 24, \ldots$$

If the series has a beginning and end it is called limited; otherwise it is infinite or *unlimited*. Any term of a limited arithmetical progression, whether increasing or decreasing, is equal to the first term plus the product of the common difference by the number of terms that precede the term in question. The sum of all the terms of such a progression is equal to half the sum of its extremes multiplied by the number of terms.

A *geometrical progression* is a series in which each term is equal to the preceding term multiplied by a constant quantity called the *ratio*. If the ratio is *positive* and greater than 1, each term is greater than the preceding one, and the progression is *increasing*; if the ratio is *positive* and less than 1, each term is less than the preceding one, and the progression is *decreasing*; if the ratio is negative, the terms are alternately positive and negative. If two consecutive terms are given, we can find the ratio by dividing the second by the first. The following series, extending to an infinite number of terms in both directions, is an example of a geometrical progression:

$$\ldots, \frac{1}{4}, \frac{1}{2}, 1, 2, 4, 8, 16, \ldots$$

In this progression the ratio is 2. If we consider a finite number of terms as constituting a limited geometrical progression, the nth term of the series, n being any positive whole number, is equal to the first term multiplied by the $(n-1)$th power of the ratio; the sum of all the terms is equal to $\frac{lr-a}{r-1}$, in which l is the last term, a the first term, and r the ratio.

An *harmonical progression* is a series such that of any three consecutive terms the first is to the third as the difference between the first and second is to the difference between the second and third.

Progressive Party, political party organized in the U. S., 1912, as a protest of "progressive" Republicans against the conservative tendencies of those in control of the Republican party. The first national convention, held at Chicago, August 5, 1912, nominated Theodore Roosevelt for President and adopted a platform embracing many schemes for the securing of social justice and popular government. The party was rapidly organized in all the states, and in the elections of 1912, polled 4,123,206 popular votes, elected 88 Presidential electors, and secured control of the legislature of one state.

Prohibi'tion, writ issued by a superior court to restrain the action of an inferior tribunal which is assuming to act in some matter not within its jurisdiction, or in disregard of the rules which govern it. Also, the suppression by law of the manufacture, importation, and sale, for beverage purposes, of all alcoholic liquors. The prohibitionists advance the following arguments: (1) Scientific. That alcohol is a poison, not a food, and neither necessary nor beneficial to healthy persons. (2) Social. Alcoholic liquors affect not only the drinker, but transmit to his descendants the seeds of disease. (3) Economic. The raw material consumed, the labor performed, and the money spent in the making and purchase of alcoholic liquor as a beverage constitute a waste of wealth. (4) Political. The deterioration of the citizen is a national injury, and the organized liquor trade has become an active factor, defying legal restraint, thwarting justice, dominating politics, and corrupting elections and officials.

The prohibition movement in U. S. began with the formation of the Republic. The first Colonial Congress, in 1774, passed the following: "*Resolved*, That it be recommended to the several legislatures of the united colonies immediately to pass laws the more effectually to put a stop to the pernicious practice of distilling, by which the most extensive evils are likely to be derived if not quickly prevented." From 1829 the movement was pushed, and some local prohibition laws were enacted, but between 1850 and 1860 a number of state laws were secured, beginning with the "Maine Law," enacted 1851. In nearly every case, however, these laws were soon repealed, and later attempts to secure prohibition by constitutional amendments had only a very limited success. With the woman's crusade, 1873–74, and the organization of the Women's Christian Temperance Union, 1874–75, the agitation took on a wider and more systematic sweep, which was promoted by the organization and work of the National Prohibition Party. (See PROHIBITION PARTY.)

In 1917–19 a great prohibition wave swept over the U. S. and its possessions. A majority of the states under local option laws became "dry"; the President prohibited the manufacture of beer after December 1, 1918; Congress adopted an amendment to the agricultural appropriation bill to establish prohibition until the armies were demobilized, effective July 1, 1919; and in August, 1917, the U. S. Senate and, in December following, the House of Representatives, adopted a prohibitive amendment to the Federal Constitution; which, later, was ratified by thirty-seven states, one more than was necessary.

Prohibition Par'ty, political party organized in the U. S., pledged to the election of officers committed to certain reforms, among which prohibition of the alcoholic drink traffic was the chief element. The first national nominating convention of the party was held in Columbus, Ohio, February 22, 1872.

Project'iles, bodies projected or thrown forward by force. Generally speaking, they are missiles used in warfare, fired from a gun by means of some explosive substance. They are classified as *spherical* and *oblong*. The former are obsolete, and were used in smooth-bore guns. In each class there are several varieties, such as solid shot, shell, and case shot. *Chain shot*, two projectiles joined by a short chain, and *bar shot*, two projectiles joined by a bar, were used in smooth-bore guns, but are now obsolete. *Hand-grenades* were shells intended to be thrown by hand at an assaulting party. Shells filled with inflammatory material for incendiary purposes and a combustible shell filled with a slow-burning substance to illuminate the enemy's works were used in the earlier days of warfare.

FIG. 1.—STAND OF GRAPE.

The first projectiles used in guns were made of stone, lead, wrought and cast iron. Solid spherical shot was used against masonry and armored vessels. A shell is a hollow projectile containing a bursting charge which is ignited at some point of its flight by the burning of an attached fuse. Shells were used against earthworks, unarmored vessels, and against such armor as they might penetrate. *Case shot* (spherical) are shells filled with small projectiles, which are scattered when the bursting charge explodes. *Grapeshot* consists of nine spherical shot, arranged in three tiers of three projectiles each, held in place by rings and a top and bottom plate connected by a central bolt. *Canister* consists of a number of small balls inclosed in a tin or sheet-iron case. *Shrapnel* consists of an oblong shell, containing a number of small balls, a bursting charge, and a fuse by means of which the shell is exploded at any desired distance.

All projectiles containing smaller projectiles are classed as case shot, and are used against animate objects. Oblong projectiles possess many advantages over spherical projectiles. They have greater ranges for equal muzzle velocities, greater penetration, and greater accuracy. They are the only kind used in rifled guns, and at the present time are also being used in rifled mortars.

In order to cause an oblong projectile to travel without pitching or tumbling and with its point foremost it is necessary to impart to it a rotary motion about its longest axis. This rotary motion must be sufficient to overcome the tendency of the projectile to rotate about its shortest axis. The device used to cause rotation of the projectile differs for muzzle-loading and breech-loading guns. One method is to stud the projectile with small projections in the form of a spiral to fit the spiral grooves in the gun. Another method is to fit a brass ring to the large end of the projectile. On the side toward the charge this ring has a deep annular groove. On firing the charge the pressure of the gas expands the outer edge of the ring, pressing it into the grooves or rifling of the gun. Since the projectiles of breech-loading guns are passed into the gun through the breech opening, they are fitted with a device which, being larger than the bore of the gun, is pressed into the rifling when the projectile is fired. This device usually consists of a brass or copper ring or collar, and sometimes more than one is used. Oblong projectiles vary in length from three to five times their caliber, and have been made longer for use against earthworks. The bursting charges used in projectiles are generally composed of powder ignited by a time or impact fuse.

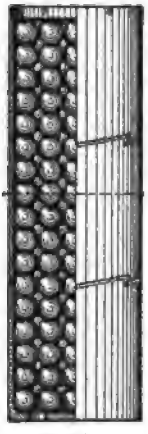


FIG. 2.—SAWYER CANISTER.

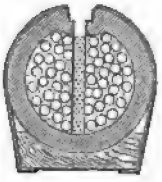


FIG. 3.—SPHERICAL CASE-SHOT.

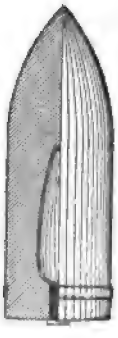


FIG. 4.—CORED SHOT, For U. S. 12-inch breech-loading rifle.

FIG. 5.—0.3-INCH BULLET.

In armor-piercing shells the heat generated by the impact is sometimes used to explode the shell. In the small-caliber rifles of the present, which are about three tenths of an inch diameter, a much more rapid twist in the rifling is required. Lead would melt by the heat generated, and therefore the projectile or bullet is made with a lead body and covered with a jacket of harder material, such as steel, copper, or German silver. See ARTILLERY.

Projec'tion, representation of a magnitude on a plane or other surface made in accordance with some geometrical law. In geometry projection is restricted to the delineation of an object on a plane surface by rays issuing from a point and intersecting the contour of the object; and this is in most cases the meaning of the word. If the point be supposed infinitely distant, the rays form a system of parallels. If their direction is perpendicular to the plane, we have *orthographic* projection; if the direction is not perpendicular, we have *oblique* projection; and if the point is at a finite and proper distance for ordinary vision, we have *perspective* projection, or linear perspective. In geometry the object projected is a geometrical figure; the fixed point is called the vertex, the joining lines form a cone, and the section in which the cone is cut by any plane (the plane of projection) is called the projection. This method supplies very important conclusions, according to which from a particular theorem, the general one under which it is contained, may be inferred.

Prometheus (prō-mē'thūs), in Grecian mythology, son of the Titan Japetus and Clymene and brother of Atlas, Menœtius, and Epimetheus. Jupiter, indignant at a deception practiced by him, withheld fire from mortals, and Prometheus, their tutelary representative, stole it from heaven in the hollow of a tube. Jupiter then sent Pandora to earth with her box of evils, and fastened Prometheus to a rock or pillar, where he remained for many generations, an eagle every day feeding on his liver, which every night grew again. At length Hercules was permitted to kill the eagle and free the prisoner. The most celebrated drama founded on this myth is the trilogy of Æschylus, of which the "Prometheus Bound" and a few fragments of the "Prometheus Loosed" are extant.

Prom'ise (in law). See CONTRACT.

Prom'issory Note, promise in writing to pay money. When not negotiable, the rules of law applicable to it vary but little from those in relation to written contracts generally. See NEGOTIABLE INSTRUMENTS.

Prong'horn. See ANTELOPE.

Pro'nouns, a class of words which serve the purpose of indicating objects without naming them. They do this in terms of the context or situation and of relations to the speaker. Thus when *he said* is used to replace *John said,* the pronoun *he* indicates either in relation to something said before or in relation

to what is in the speaker's presence. Nouns are name words. Pronouns are essentially gesture words. They act as proxies for nouns. They are not, however, mere stop gaps or dummies, but, being universal or public proxies—*i.e.*, capable of substitution for any noun—they are selected according to the relations borne by the object named either to context or speaker. They therefore give to language the possibility of expressing vastly more than the use of nouns alone would permit.

The so-called adjective pronouns or pronominal adjectives, like *this, that, other, all,* etc., are pronominal in the sense that they express general relations to context, situation, environment, but not in the sense that they are necessarily substitutes or proxies for nouns. They may dispense with the use of the noun, but generally the apposition of the noun is found desirable; thus *get that* may require, in order to clearness, the addition of the name of the object, *get that hat.* A large class of so-called adverbs, like *here, there, then, thus,* are pronominal in precisely the same sense as *this, that, such*; they may be called pronominal adverbs. In the sentence *he speaks so,* the action-name *speaks* is modified by the pronominal adjunct *so,* just as, in the sentence *he uses such language,* the name language is modified by the pronominal adjunct *such.* The conjunctive adverbs *where, when, while, as,* etc., are pronominal in precisely the same sense as the relative pronouns *who, which,* etc.

Propagan'da (CONGREGATIO DE PROPAGANDA FIDE—"Congregation for Propagating the Faith"), board of 25 cardinals founded at Rome, 1622, by Gregory XV for the support and direction of foreign missions. Urban VIII added to it, 1627, a college for the training of missionary priests of all nations, with which a polyglot printing establishment was connected. The college was suppressed 1873.

Propaga'tion of the Faith, Soci'ety for the, Roman Catholic society in aid of foreign missions founded at Lyons, 1829. Its plan is to raise, through committees and subcommittees, one cent a week from each subscriber. Its membership is numerous in nearly all parts of the world, and its receipts are very large. The central committee at Lyons publishes bimonthly *Annales de la propagation de la foi.*

Proph'ecy, prediction of future events. The word prophet is derived from the Greek interpreter, by which the Septuagint renders the Hebrew *nabi*; but the term does not fully correspond to the Hebrew word, which denotes a man speaking by divine inspiration. The prophets of the Old Testament appear as the privileged organs of communication between God and His people. They also acted as the interpreters of the law, and were guardians of the rights of the oppressed. Their mission, as a body of extraordinary teachers, became important in times of apostasy. In the age of the judges, prophecy in scattered instances exerted a powerful influence; but the conspicuous prophetic agency begins with Samuel, who founded schools of the prophets at Gibeah, Ramah, Bethel, Jericho, and Gilgal. Instruction was given in the interpretation of the divine law, and in music and sacred poetry. The prophets were not always taken from these schools; for instance, Amos was a herdsman. Sometimes, but rarely, women came forward as prophetesses. About one hundred years after the return from the Babylonish captivity the prophetic profession ceased. The New Testament mentions the power of prophecy as one of the gifts of the Holy Spirit, but generally foretelling is not mentioned as characteristic of those men who, as Barnabas, Judas, and Silas, are called prophets. The object of the Christian "prophecy" was (1 Cor. xiv, 3) "edification and exhortation and comfort"; and only one book of the New Testament, the Revelation, bears a strictly prophetic character.

Propor'tion, in mathematics, an equality of ratios, a ratio being the relation, expressed by division, which one quantity bears to another. Four quantities are said to be in proportion when the ratio of the first to the second is equal to the ratio of the third to the fourth. A proportion may be written in either of two ways; thus if the ratio of a to b is equal to the ratio of c to d, the equality may be indicated by either of the following expressions:

$$\frac{b}{a} = \frac{d}{c}, \text{ or } a : b :: c : d.$$

Either of them may be read *a is to b as c is to d.* The first and third terms are *antecedents*; the second and fourth terms are *consequents*; the first and fourth are *extremes*; the second and third are *means.* The first ratio is called the *first couplet,* and the second ratio is called the *second couplet.* Two varying quantities are said to be directly proportional when their ratio is constant; inversely, or reciprocally, proportional when their product is constant. See RATIO.

Prop'ylite, name given to certain altered forms of andesites and allied volcanic rocks (formerly called greenstone trachytes), which are greatly developed in the silver districts of Hungary and the Comstock lode (Nevada). The name was selected under the impression that these rocks constituted a distinctive type which ushered in a renewed period of volcanic activity at the beginning of the Tertiary period, after long-continued inactivity in Mesozoic times. These rocks have since been shown to be only normal and widely distributed igneous varieties, whose ferromagnesian constituents have been extensively altered to fibrous hornblende, epidote, chlorite, and similar secondary minerals.

Pros'ecutor, in law, one who institutes and carries on a criminal proceeding against another in the name of the government. In the U. S. a system of prosecution by public officers is followed, and private prosecutions, except for petty offenses and in the lowest courts, are almost unknown. District attorneys or prosecuting attorneys are appointed by the Federal and state governments to take charge of prosecutions, oversee the finding of indict-

ments, and conduct the trial for the state. The injured person can do no more than lodge a complaint before the committing magistrate or the grand jury, and thus secure the arrest of the accused for examination and indictment. The public officer may employ private counsel in some instances or surrender the case to them, but they act as his delegates.

Pros'elytes, among the post-exilic Jews, Gentiles who conformed to Judaism. The rabbis speak of "proselytes of the gate," who simply observed the seven precepts of Noah; and "proselytes of the covenant," or of "righteousness," who were circumcised, baptized, and allowed all the privileges of the Jews.

Pros'erpine, or **Perseph'one,** in Greek and Roman mythology, the queen of the infernal world; daughter of Jupiter and Ceres; beloved by Pluto, who forcibly carried her off to Hades. Ceres induced Pluto to consent that her daughter should pass two thirds (according to later writers, half) of every year in the upper world with her; and hence Proserpine became a symbol of vegetation. The Eleusinian mysteries belonged to her in common with her mother.

Pros'ody, branch of grammar that treats of quantity, accent, and the laws of versification. In the Greek and Latin languages every syllable had its assigned quantity or length, and verses were constructed by systems of recurring feet, each foot containing a certain number of syllables, with a definite quantity and arrangement. In English and most modern languages, versification depends mainly upon accent and the number of syllables. Rhyme has also been added to modern verse. A verse is a period of rhythmical speech sufficiently short to be perceived as a whole by the rhythmical sense. A verse whose last foot is incomplete is catalectic. The pause which makes a division in a verse is called the cæsura. See METER; POETRY; RHYME; VERSE.

Prosper' (surnamed AQUITANUS), **Saint,** abt. 403–464; Church Father; b. near Bordeaux; was a chronologist, poet, and theologian; chiefly known from his opposition to Pelagianism; appears to have been always a layman; day, June 25th. There are several editions of his works, the most celebrated of which is the "Carmen de Ingratis," one of the best Latin poems by a Christian author.

Protag'oras, abt. 480–411 B.C.; Greek philosopher; b. Abdera; first to assume title of sophist, as denoting one who instructed others in the art of becoming wise, and in the arts of eloquence and politics; also the first to receive pay for his lessons. After teaching forty years, he was expelled from Athens for expressing doubt of the existence of the gods, and his books were burned.

Protec'tion, term in political economy correlative with free trade, referring especially to the relation of legislation to the movement of industry. Free traders hold that legislation should offer no inducement to capital to take any direction which it would not assume in the absence of such legislation. Protectionists hold that situations arise in which the general interest may be best served by offering such inducements. At one time the free-trade policy was advocated on grounds which practically reduced civil government to the functions of the policeman. The reaction against this *laissez-faire* theory has taken the point from many arguments once alleged for the free-trade policy, and it is now defended on grounds chiefly of its economic expediency. The four forms of the practice of protection to home industry are not antagonistic, but mutually corroborative.

I. The mercantile school generally defended the protectionist policy in view of the industrial use and the international circulation of money. Seeing that the increased supply of this instrument of industrial association had resulted in a rapid and great development of productive industry, they insisted that a "favorable balance of trade" was an object of national policy. No country could safely import to a larger extent than it exported, and if its imports fell below its exports, so that it drew upon its neighbors' reserve of coin in payment of the difference, so much the better. To this end the development of manufactures and the checking of imports by duties (or even prohibitions) were desirable means. The former enabled the country to sell more; the latter insured its buying less.

II. The nationalist school of protectionists arose in the new awakening of national feeling in the revolt against the imperialism of Napoleon. In this view nations are industrial no less than political units, and national boundary lines are economic boundaries also. Industrial power and independence are essential to political power and independence. National industry is one of the forms of national wealth, and is as much entitled to protection as is any other.

III. The biological school of economists was founded by Henry C. Carey, of Philadelphia. He points out that at the starting point of economic development man is isolated and feeble, his first need being association with his fellows. Until he attains this he is occupied with a struggle for bare existence. With the growth of numbers and of association this struggle becomes easier, and sets some free to provide for less primary but not less real wants. Hence the rise first of the artisan class, and afterwards of classes which serve the intellectual needs. At each step onward production grows faster than numbers. He recognized the power of highly developed nations to check the industrial growth of those less advanced than themselves. That power he would check by legislation to lay duties on imports, not in order to contravene natural law or find a substitute for it, but to remove an obstacle to its operation.

IV. Among protectionists there has been a tendency to treat the development of domestic industry as a branch of the great social problem. The policy is defended as securing juster and more adequate remuneration to the laboring classes of the U. S., for its indirect operation does raise wages, and has done so in the U. S., France, and Germany. One reason of this is that the demand for labor more nearly ap-

proaches the supply in countries of diversified industry than in those where there is but one kind of employment. Another reason is seen in the fact that agriculture calls for little else than unintelligent and ill-paid labor, while manufactures demand intelligence and skill, and must pay for them. See FREE TRADE; REVENUE; TARIFF.

Protect'or, in English history, a title several times conferred by Parliament on the chief officer of the kingdom during the minority, in place of that of regent. Oliver Cromwell, as well as his son Richard, bore the title of Lord Protector.

Pro'teids. See ALBUMINOIDS.

Protein (prō'tē-ĭn), term applied to a product of the metamorphosis of albuminoids (*q.v.*), produced by the action of caustic potash, and believed to constitute the basal molecule of all the proteids.

Proterozo'ic E'ra, earliest of the great divisions of geologic time based on life. No faunas and floras of this era have been discovered, and only a few traces of organic forms. The life of the Paleozoic periods is shown by fossils to have been varied and highly organized, and, in accordance with the doctrine of evolution, it is inferred that long periods were necessary for its development. See GEOLOGY.

Prot'estant, collective name for all Christian denominations except the Roman Catholic and Eastern churches. The name originated, 1529, in Germany, at the Diet of Spire, which had passed a resolution that, until the convocation of an ecumenical council, all further innovations in religious matters should be prohibited. To this resolution the Elector of Saxony, the Margrave of Brandenburg-Anspach, the Duke of Brunswick-Luneburg, the Landgrave of Hesse, the Prince of Anhalt, and fourteen imperial cities entered, on April 19th, a solemn protest. Henceforth they were called Protestants, and the name Protestant therefore came early into use to designate the adherents of the Reformation generally. The number of Protestants in all countries is estimated at 143,237,625.

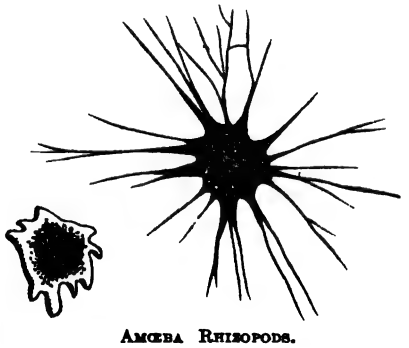
Protestant Epis'copal Church. See EPISCOPAL CHURCH, PROTESTANT.

Proteus (prō'tē-ŭs), in classic mythology, a subject, or according to some versions a son, of Poseidon, whose flocks of seals he tended on the island of Pharos, off Egypt. He was gifted with the power of foretelling the future, but, as he disliked prophesying, he used to escape from those who succeeded in catching him when he came up from the depths of the sea to sleep among the rocks, by assuming the most horrible or disgusting shapes. The conflict of Menelaus with Proteus is narrated in Homer's "Odyssey."

Pro'tophytes, *Protophyta*, the lowest branch or division of the vegetable kingdom. The plants collected here consist of single cells, or loose chains of cells, with little, if any, differentiation of the cells. They reproduce by the division of cells and by the asexual production of spores or cysts. Most of the species are of some shade of green, as blue green, smoky green, brownish green, reddish green, etc., but never chlorophyll green.

Pro'toplasm, a substance consisting of carbon, oxygen, nitrogen, and hydrogen, nearly identical with the white of an egg, and constituting the most elementary living matter in animal and plant structures. It is colorless, transparent, and apparently destitute of structure, and is seen in its simplest form in some of the lowest types of animal life, as in the *Protozoa*. When unrestricted by an imprisoning envelope it is endued with the power of extending itself in all directions in the form of mutable processes, which can be withdrawn spontaneously, and it has also the power of passing or flowing in minute masses through closed membranes without these masses thereby losing their identity of form. In the form of cells, the skin of which is merely dead and hardened protoplasm, and inclosing a nucleus, or with a nucleus embedded in its substance, it is the structural unit of all organized bodies, constituting not only the basis of the ovum of both plants and animals, but of the tissues themselves in their perfect state, which are mere multiples of such cell units variously modified. As the protoplasm in our bodies is continually undergoing waste, a continuous renewal of the material is essential to the continuance of life. Animals, however, cannot elaborate protoplasm from mineral substances for themselves, they being able only to convert by the process of digestion dead protoplasm into living. Plants can, on the other hand, manufacture protoplasm from mineral compounds and the atmosphere, and so they are the storehouse of protoplasmic matter for the animal kingdom.

Protozo'a, subdivision of invertebrate animals, comprising many of the so-called animalcules, as well as the large sponges. They



AMŒBA RHIZOPODS.

are composed of a nearly structureless, jelly-like protoplasm, without distinct segments, internal cavity, or nervous system, and with no or a very rudimentary digestive apparatus. As these represent the first step in animal organization, so do the protophytes the first in vegetable life; the former were called *oözoa* by Carus, from their resemblance to the ova or germs of higher animals; the latter, as

far as known, were microscopic seaweeds, without the radiate structure characteristic of plants, and are found in the lower Silurian strata.

Protract'or, instrument for laying off angles in plotting. It may be circular, semicircular, or rectangular. The circular protractor sometimes has three arms affixed to it, for measuring more than single angles, when it is called a three-arm protractor. By still further adding index arms carrying mirrors, the reflecting protractor is formed, which is convenient in hydrographic surveys.

Proudhon (prō-dōṅ'), **Pierre Joseph**, 1809–65; French socialist; b. Besançon; first attracted attention 1840 by his pamphlet, "What is Property?" which opened with the dictum, "Property is Theft." On this he assumed that simply by being born into the world every man has a right to a share of what the world contains of necessities, comforts, and enjoyments. The Academy censured it, and withdrew the allowance which had been granted him for an essay on grammar. In 1843 he published "De la Création de l'Ordre dans l'Humanité," in which he expounded his theories of a new political organization, and, 1846, "Système des Contradictions économiques, ou Philosophie de misère." When the Revolution of February, 1848, broke out in Paris, he immediately went there, published "Solution of the Social Problem," and began the issue of a daily paper, *Le Représentant du Peuple*, in which he set forth the most radical opinions. He was elected to the Constituent Assembly, but as nobody would hear him when he spoke, he returned to the press, editing in succession three daily papers. In January, 1849, he undertook to establish a bank of gratuitous credit, but in March was sentenced to three years' imprisonment for illegal publications, and fled to Geneva. He issued from his prison, among other works, "La Révolution Sociale démontrée par le Coup d'État," regarded as a partial apology for Napoleon's policy, and he was released June 4th. His subversive work, "De la Justice dans la Révolution et dans l'Église," subjected him to another sentence of imprisonment; but he was in Belgium, whence he returned under the amnesty of November, 1860.

Prout, Fa'ther. See MAHONY, FRANCIS.

Provençal (prō-văṅ-săl') **Lan'guage**, group of dialects spoken in S. France in the Middle Ages, and of great literary and philological importance. Another name for the language is preserved in the geographical designation Languedoc (originally "language of yes" from the Provençal word for "yes," just as the French of N. France was called *langue d'oïl* from the old French word for "yes"). Provençal was the earliest cultivated Romance language to emerge from the late spoken Latin. From the tenth to the thirteenth century it was a celebrated means of literary expression, the poets of Provence being especially celebrated. The conquest of S. by N. France led to the decay of Provençal culture, and in the fifteenth century the language had degenerated into a mere patois or dialect spoken by about ten million people. While it lasted, however, Provençal literature was accepted universally in Europe as the most refined of all. It served as a model for the first Italian, the first Spanish, and the first Portuguese lyric poets; it gave rise to one of the chief poetic schools of N. France; and hardly any literature in Europe fails to show numerous traces of ideas and poetical forms that had their origin in this. In the nineteenth century an attempt was begun to revive the literary standing of Provençal, and some poems of interest have recently been written in it.

Provence (prō-văṅs'), old province of France; bounded E. by the Alps and S. by the Mediterranean; now divided into the departments of Var, Bouches-du-Rhône, Basses-Alpes, and Vaucluse; derived its name from the Latin *Provincia*, by which the Romans preëminently designated it. After the fall of the Roman Empire Provence was overrun by the Goths and the Saracens, and during the Middle Ages was ruled by independent counts. In the twelfth century this land, celebrated for its climate, sky, and fruit, produced the famous Provençal songs. In 1481 it was annexed to the French crown by Louis XI.

Prov'erb, popular wisdom, often expressed by "the wit of one," always concentrated in a handy sentence, and actually in use by the people. Proverbs are now regarded by all critics as belonging to the oldest phase of primitive poetry. The proverb is a general statement which fits a number of particular cases; is the wisdom or wit of the masses, and therefore flourishes best among unlettered folk—like the ballad and the popular tale. Like the latter, moreover, it is often imported, and is particularly at home in the Orient. Collections of proverbs were attempted even among the Greeks, but modern interest in the subject was awakened and led by Erasmus. His "Adagia" were published 1500, and found speedy imitation in several countries. The Germans were among his most successful followers, and they have outdone all competitors for later times, with the single exception of Spain. English proverbs are fairly plentiful, and proverbial poetry has always been popular with Germanic races. A peculiar form of this poetry is preserved in the so-called gnomic verses of the Anglo-Saxon.

Proverbs, Book of, a title which in the original Hebrew term (*mashal*) means properly a "comparison"; but as every utterance of a truth involves a comparison, we find included in the book apophthegms, maxims, enigmas ("dark sayings," in the English version of Prov. i, 6), and sometimes longer connected discourses of the same didactic nature.

It is said in 1 Kings v, 12 that Solomon spoke 3,000 proverbs, and it is probable that many of these are found in this book, as the superscription prefixed to each of their three main divisions assigns it to Solomon. The first division (chaps. i–ix) is devoted to a

description of wisdom and an exhortation to its pursuit. The second (chaps. x–xxiv) contains individual proverbs, and in its latter part brief proverbial discourses. The third (chaps. xxv–xxix) was a compilation by "the men of Hezekiah." In chaps. xxx and xxxi we have three appendices. The first is by an author known to us only by the name Agur, given to him in chap. xxx, 1; the second (chap. xxxi, 1–9) contains precepts for a King Lemuel, given by his mother. *Lemuel* ("one belonging to God") is clearly only a symbolical name, and a general resemblance in style has led some to infer that this, as well as the final sections (chap. xxxi, 10–31), was also written by Agur.

The Proverbs exhibit the results of reflection upon the moral and spiritual value of its precepts in the concerns of life. It is noteworthy that they do not once mention the priest nor exalt the externals of worship, nor allude to any conflict between the worship of Jehovah and that of idols.

Prov'idence, capital of State of Rhode Island and of Providence Co.; at head of navigation on Narragansett Bay; 30 m. N. by W. of Newport. Two small rivers meeting divide it into two parts, the E. and W. sides. At the junction of these rivers was formerly the Cove, now filled in. Of public parks the most important is the Roger Williams (102 acres); contains a fine statue of Roger Williams, founder of the city and state. The first Baptist meetinghouse was built 1775. The largest church edifice is the Roman Catholic cathedral. The principal educational institution is Brown University. The city is especially rich in public and private libraries. Besides that of Brown University are the public library, Athenæum Library, and library of the late John Nicholas Brown, unequaled in its Americana. Providence is especially noted for its manufactures of cotton and woolen goods, firearms, jewelry, silverware, tools, locomotives, boilers, steam and electrical engines, screws, files, sewing machines, etc. "Factory-system" plants (1909), 1,080; capital invested, $118,512,000; value of products, including custom work, etc., $120,241,000. The city is a great wholesale and distributing point. Immense quantities of coal are transshipped from its wharves. The commerce is mostly coastwise. Lines of steamships run to Baltimore, Philadelphia, and New York City. As a seaport for two hundred years the town grew slightly, though its commerce was extensive. With manufactures came marvelous development. Pop. (1910) 224,326.

Prov'incetown, town and popular summer resort; Barnstable Co., Mass.; on N. extremity of Cape Cod; 55 m. by water SE. of Boston; has a deep, almost entirely landlocked, harbor on inner side of cape; principal industries, whaling and cod and mackerel fishing; has large Portuguese population; first landing place of the Pilgrim Fathers, 1620; tower to commemorate this event dedicated, 1907, in presence of Pres. Roosevelt; birthplace of first child born in New England of English parents.

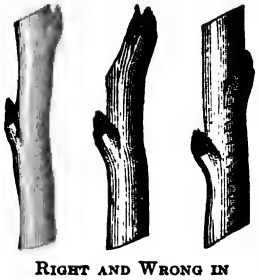
Pro'vo Riv'er, river of Utah; rises on the W. slope of the Uintah Mountains, flows W. in a deep, wild cañon through the Wasatch Mountains, and empties into Utah Lake, tributary to Great Salt Lake; 100 m. long.

Prov'ost Mar'shal, in the army and navy, officer who attends to the execution of martial law, the fulfillment of sentences by courts-martial, and the like; preserves order in towns and districts under military control; and has certain summary powers under the Articles of War.

Pruden'tius, Aurelius Clemens, b. 348 A.D.; Latin Christian poet; b. Spain; became a civil and criminal judge; appointed to a high military station at court of Rome; devoted later years to religious exercises and study; extant poems are: "Præfatio, Cathemerinon Liber" (twelve sacred hymns), "Apotheosis," "Hamartigenia," "Psychomachia," "Contra Symmachum, Liber I," "Contra Symmachum, Liber II," "Peri Stephanon Liber," "Diptychon" or "Dittochæon" (forty-eight poems in heroic hexameters), and the "Epilogus."

Prune, dried fruit of certain kinds of plums; finest sorts called *prunelles*. The best-known prunes come from France, but Germany furnishes large amounts of a coarse kind. Turkey and Spain also export prunes. They are sometimes dried by artificial heat and sometimes in the sun, or perhaps more commonly are half dried by stoves, the process being finished in the sun. California is an important prune producer.

Prun'ing, act of cutting off parts of a tree or shrub, either for the purpose of producing a certain shape or of increasing the production of fruit or timber, or improving the size and quality of the fruit and the ease of picking the crop and caring for the plant; also to facilitate the fighting of insects and fungi. Forest trees are pruned to increase the quantity of timber in the trunk by diminishing the side branches, beginning at the lower part of the tree. In fruit trees the branches are thinned out in order to admit the air and light more freely to the leaves, blossoms,



RIGHT AND WRONG IN PRUNING.

A PYRAMIDAL TREE PRODUCED BY PROPER PRUNING.

and fruits, and to concentrate and increase the nourishment for the branches which remain. In pruning for the purpose of producing fruit it is necessary to know on what branches and buds the fruit grows. The grape generally bears on shoots of the current year, the peach on those of the preceding year, and the apple and pear on wood of two or three years' growth. It is generally considered that early spring or late winter is the best season for pruning. For explicit directions, see the various fruit manuals.

Pruri'go, condition of the skin, characterized by intense itching and by the presence of small points filled with a watery liquid.

Prus'sia (German PREUSSEN), principal state of the former German Empire, comprising almost two thirds of its entire area; bounded by the North Sea, Oldenburg, Denmark, Mecklenburg, and the Baltic on the N., by Russia on the E., the Austrian Empire, Kingdom of Saxony, Thuringia, Bavaria, Hesse, and Alsace-Lorraine on the S., and by Luxemburg, Belgium, and the Netherlands on the W.; area, 134,616 sq. m.; pop. (1910) 40,165,219; capital, Berlin; comprised the provinces of E. Prussia, W. Prussia, city of Berlin, Brandenburg, Pomerania, Posen, Silesia, Saxony, Schleswig-Holstein, Hanover, Westphalia, Hesse-Nassau, Rhine, and the detached Hohenzollern; islands belonging to it, Rugen, Fehmarn, and Alsen in the Baltic and the N. Frisian Islands and Heligoland in the North Sea; chief nationalities, Germans, Poles, Czechs, Danes, Lithuanians; principal religious denominations, Lutheran, Roman Catholic, Israelite.

The principal part of the kingdom in the N. and E. belonged to the great N. plain of Europe; NE. coast of Schleswig-Holstein, high and cut by numerous fiords; on S. and SW. surface for the most part hilly or mountainous; principal mountains the Sudetic Range, including the Riesengebirge (5,255 ft.), on the S. toward the borders of Austria; farther W. the Thuringian and Hartz Mountains, and still farther to the W. the Teutoburgerwald, Weser Mountains, Taunus, and Westerwald. Hohenzollern lies in the Suabian Alps. Principal rivers the Rhine, Ems, Weser, Elbe, Oder, Vistula (Weichsel), Niemen, and their affluents; coast had a number of bays, among them Kiel, Rugen, and Pomeranian, and the great Gulf of Danzig, so called, and some large inlets, the most important of which were the Stettin, Frisches, and Kurisches Haff. Climate temperate, and on the whole salubrious; the higher regions of the W. characterized by raw winds; more protected part adjoining the Sudetic Range, Saxony, the S. of Hanover, and the middle Rhine, mild and equable; mean annual temperature of E. Prussia, 6.33° C.; about the confluence of the Moselle with the Rhine reaches 10.1° C. About the lower water of the Vistula and the Oder, highest lands consist for the most part of sand and clay; former NW. provinces have in parts dry and barren soil, alternative with marsh and turf moor; most fertile portions in Saxony, the foothills of the Sudetic Mountains and the Thuringian, Weser, Westerwald, and Taunus uplands. Principal agricultural products, rye, hay, oats, potatoes, wheat, barley, beet root, rape seed, flax, hops, and tobacco, fruit grown in warmer parts of the country, wine produced on the Rhine and the Moselle, the Saale, and Unstrut, and in Silesia. Stock raising extensively carried on. Most important minerals, coal, iron, zinc, lead, copper, cobalt, nickel, and rock salt; amber found on the Baltic coast. Prussia was one of the greatest manufacturing countries of Europe; iron industry among the foremost in the world; also yielded about half of the world's product of zinc. Principal manufactures, metallic wares, machinery, cotton goods, silk, velvet, linen, cloth, paper, leather, and beet-root sugar. Exports included manufactured goods of great variety, grain, timber, wool, live stock. The public educational system had reached a particularly high standard of development; education general, and in the elementary schools compulsory. Educational institutions included ten universities.

The government was a hereditary constitutional monarchy, administered by the king and the Landtag; latter consisted of two chambers—the Herren-haus, or House of Lords, and the Abgeordneten-haus, or House of Delegates, with 433 members elected for three years. The king was the German emperor. Prussia had 17 representatives in the Bundesrath and 236 members in the Reichstag. A Prussian people (Pruzi, Prutheni), akin to the Letts and Lithuanians, first appeared in history near the end of the tenth century in the region to the E. of the Vistula. By the Peace of Thorn, 1466, the whole country W. of the Vistula was ceded to Poland, and her sovereignty was acknowledged over the remainder. In 1511 Albrecht, Margrave of Brandenburg, of the family of Hohenzollern, was elected grand master, and, 1525, he transformed the greater part of E. Prussia and a small part of W. Prussia into a temporal hereditary dukedom. After the death of Duke Albrecht Freidrich, 1618, and the extinction of the lateral line, the dukedom fell to the electoral house of Brandenburg. It continued, however, a fief of the Polish crown till 1656.

In the peace treaty following the World War a large part of the former territory of Prussia was ceded by Germany to new and other nations. W. Prussia was relinquished to the new republic of Poland; sovereignty over the NE. tip of E. Prussia, the internationalized areas about Dantzig, and the basin of the Sarre, was lost; the future of the S. and E. frontier of E. Prussia, as touching Poland, was to be settled by plebiscites; and the SE. third of E. Prussia and the area between E. Prussia and the Vistula was to have its nationality determined by popular vote. Dantzig and the immediate territory about it will hereafter be known as the "free city of Dantzig," under the guarantee of the League of Nations. See also GERMAN EMPIRE.

Prus'sian Blue, or **Ber'lin Blue,** ferric ferrocyanide, produced by precipitating ferric chloride or sulphate with potassium ferrocyanide; or by precipitating the ferrous sulphate (copperas) with the same reagent.

Prussian Carp. See GIBEL.

Prus'sic Ac'id. See HYDROCYANIC ACID.

Pruth, tributary of the Danube; rises on the NE. side of the Carpathian Mountains in Galicia, runs through Bukowina, forms the boundary between Rumania and Russia; enters the Danube at Reni, 13 m. below Galatz, after a course of about 520 m.; becomes navigable from near Jassy.

Prynne (prĭn), **William,** 1600–69; English Puritan agitator; b. Swanswick, Somerset; issued, 1633, his celebrated "Histrio-Mastix, the Player's Scourge," construed into a libel on the queen; was fined £5,000, set on the pillory, had both ears cut off, and was sentenced to imprisonment for life. Having issued from his prison a tract entitled "News from Ipswich," he was again fined, pilloried, had the letters S. L. ("Seditious Libeler") burned on his cheek, and put in close confinement; 1640, was released by warrant from the House of Commons. Elected to Parliament, he conducted the proceedings against Laud, and was active in favor of the Presbyterians in their struggle with the Independents.

Przemysl, one of the oldest and most strongly fortified towns of Galicia, Austria, noted for its historical associations, its varied manufactures, and its vicissitudes in the World War. It was first invaded by the Russians, Sept. 6–Oct. 14, 1914, and again Nov.–March 22, 1915, when the Austrian garrison was forced to surrender. On June 3 following, the town was regained by Austro-Germans. Pop. (1914) 57,000.

Psalmanazar (săl-mă-nā'zăr), **George,** abt. 1679-1763; assumed name of a French impostor; pretended at first to be a Japanese and afterwards a Formosan; settled in London, and, 1704, published a pretended "History and Description of the Island of Formosa off the Coast of China," the belief in which was general until the author revealed the imposition.

Psalmody (săl'mō-dĭ), act, art, or practice of singing psalms; in a wider sense, not only the vocal rendering of the songs used in public worship, but also the study of their origin and history, as well as of the tunes to which they are sung. It was David, the Psalmodist as well as the Psalmist of the Old Testament, who instituted the formal liturgical services of praise. He had a trained choir of 4,000 Levites, who, however, came out in full force only on great occasions. Many, though not nearly all, of the Psalms of David and his followers were composed partly for use in this service, and the superscriptions of many have reference to this design. In some of these allusion is made to the musical instruments by which they were to be accompanied; in others to the pitch (treble or bass) in which they were to be sung; and in a few to some familiar tune to which they were to be adapted. Some of the Psalms give evidence of adaptation to responsive singing or chanting, which was usually done by the two divisions of the choir, though sometimes, as in Psalm xxiv, the service was probably divided between the Levites and the people. The development of psalmody in modern times in accordance with the needs of the Church has been due chiefly to two causes—the gradually increasing and ultimately predominant use of metrical songs as supplementing the old rhythmical forms, with a corresponding change in the tunes, which improved with the progress of musical science, and the growth of a hymnology in which the experiences of Christians have found expression.

Psalms (sämz), **Book of,** the title given in the Septuagint version to the book in the canon which the Hebrews called the Praise Songs, and in English the Psalter. They are sometimes called the Psalms of David, as if all or the majority of the 150 had been composed by him. In the Hebrew Bible we find the whole collection divided into five books (i–xli, xlii–lxxii, lxxiii–lxxxix, xc–cvi, cvii–cl)—a division which assumed its final shape before the completion of the Old Testament canon, but was accomplished only after several hands at various periods had helped toward the permanent arrangement. This partition is doubtless a designed correspondence with the five books of the Law.

As to the *authorship* of the several poems the superscriptions traditionally attached to many of them are the only guide. Seventy-three of the psalms are thus assigned to David, and in nearly every case the correctness of the title is attested by strong evidence in their matter and style. The same criteria enable us to assign with great confidence a certain number of the anonymous psalms to the same author, making his whole contribution to be about eighty. Twelve are ascribed to the singer Asaph, which designation also included certain of his descendants who inherited his poetical and musical gifts. Thirteen or fourteen proceeded from the "sons of Korah." Two were written by Solomon (lxxii, cxxvii, in whose superscriptions we should read "of" and not "for," as in the Revised Version). One, Psalm xc, is accredited to Moses. It is difficult or impossible to assign the remaining psalms with certainty to their true authors. The dominant school of Hebrew critics questions the correctness of these traditional ascriptions, and assigns almost all the psalms to a period long after David—indeed, some scholars set the whole collection in the Maccabean era.

The *matter* of the Psalms were the outflow of the spiritual life of the most highly endowed natures of a long period of Israel's history. Thus they contain a record of their adoration, confessions, petitions, and aspirations as these were conditioned on the one hand by their conceptions and knowledge of God and of His dealings with men, and on the other by their own inner history and outward circumstances. We find in the Psalms a vital appreciation of the ideas of God and Providence that had been unfolded in the teachings of the Law, and the most practical illustrations of the duty and privilege of worship and obedience. And so fresh, various, just, and profound are their views of the spirituality,

holiness, and goodness of God, and their representations of the yearnings, conflicts, and triumphs of the earnest soul, that the Psalter has not only prompted and made valuable all the hymnology of the Church, but has always been the chosen consoler and counselor of the Christian heart.

Psalms of Zoroas'ter, designation of the "Gathas" in metrical selections in the Avesta, containing the teachings, exhortations, and revelations of Zoroaster, the prophet of ancient Iran. The "Gathas" are five in number, and comprise seventeen short psalms, averaging about a dozen stanzas each. The prophet exhorts men to eschew evil and choose the good, the kingdom of light rather than the kingdom of darkness, and their reward shall be eternal. He enunciates the doctrine of dualism in a sort of Iranian Sermon on the Mount. The "Gathas" are the oldest part of the Avesta, and the language in which they are written is more archaic than that used elsewhere in the ancient sacred books of the Parsis.

Psaltery (sâl'tẽr-I), stringed musical instrument in use among the ancient Jews. Burney says it resembled partly the lyre and partly the harp, but according to others it was in shape a trapezium, not unlike the dulcimer.

Psammetichus (să-mĕt'I-kŭs) **I,** first king of the twenty-sixth Egyptian dynasty (666–612 B.C.). By marriage he gained alliance with the Ethiopians of Napata, and by the aid of Ionian and Carian mercenaries overthrew the Assyrian governors of the Delta region. His ambition was to make Egypt strong at home, hence he encouraged Greek immigration. He built largely at various places, and during his reign a very remarkable renaissance in art occurred. He was succeeded by NECHO (*q.v.*), who continued the same policy. Psammetichus II and Psammetichus III were rulers of small importance. The latter was defeated at Pelusium by Cambyses.

Psara (psă'ră), **or Ipsa'ra,** small island in the Grecian Archipelago, W. of Scio, belonging to Turkey; was densely peopled and very prosperous before the Greek revolution; but having been taken by the Turks, 1824, its commerce was destroyed, its agriculture fell into decay, and its population decreased very much.

Pseudepigrapha (sū-dĕ-pĭg'ră-fă), writings which bear the names of Old or New Testament characters as authors or principal subjects, but which never formed part of the canon, either Hebrew or Christian. They were produced between 300 B.C. and 300 A.D. Those which antedate Christ are to be distinguished from the APOCRYPHA (*q.v.*) of the Old Testament, which were formerly printed along with the canonical Scriptures in English Bibles. These pseudepigrapha are worthless as history, yet have a value as specimens of the thought of the times in which they were produced. They were not written by the authors they claim, yet are not on that account forgeries, in the modern sense of the term, since it was allowable then to issue writings under the name of some well-known man of a past age.

The pseudepigrapha of the Old Testament include the "Psalms of Solomon," "Book of Enoch," "Ascension of Isaiah," "Assumption of Moses," "Book of Jubilees, or Little Genesis," "Book of Adam and Eve," and the "Sibylline Oracles." The last is a collection of poems in Greek, containing Pagan and Christian elements.

The New Testament pseudepigrapha or apocrypha (which have never had a place in the canon) include the "Protevangelium of James the Lord's brother"; "Gospel of Thomas," confined to the youth of Jesus, and a tissue of miracles; "Letter of Pontius Pilate" to the Roman emperor concerning Christ; "Report of Pilate Concerning Christ," sent to Augustus in Rome; "Gospel of Peter," believed in the Early Church to be authentic; "Acts of Peter and Paul"; apocalypses of Paul, John, and Peter; "Epistle of Jesus" in reply to Abgarus, King of Edessa; liturgies attributed to the Apostles; "Didache, or the Teaching of the Twelve Apostles," one of the earliest apocrypha and the most respectable. It doubtless embodies much genuine apostolic teaching, and throws light on primitive Church usages.

Pseudotsu'ga, a genus of coniferous trees, closely related to the firs and the hemlocks, but differing from the former by having pendulous cones whose scales are persistent, and from the latter by having smooth branchlets after the fall of the leaves. Only one species is known, *P. taxifolia*, the Douglas spruce. It is a gigantic tree of the Oregon, California, and Rocky Mountain region, 200 to 300 ft. high and 8 to 15 ft. in diameter.

Psittaci (sĭt'tă-sI), an order of birds containing the parrots, characterized by a hooked and cered beak movably articulated with the brain case, a strong lower jaw, and by having the outer toe turned backward. The tongue is thick, fleshy, and sometimes brushy; the number of primaries and tail feathers is ten. The furculum is weak, imperfect, or absent. The order is divided into from one to nine families; but a good division is into three families, *Psittacidæ*, the true parrots; *Stringopidæ*, owl parrots, and *Cacatuidæ*, cockatoos.

Psocidæ (sŏs'I-dē), a family of insects, the sole representatives of the order *Corrodentia*. They are small forms with incomplete metamorphosis, with biting jaws, sometimes without wings, but when these are present having the fore wings the larger. All of the species feed on dry vegetable matter, and several species (winged) occur on forest trees of the U. S. through the summer. Among the wingless forms are the so-called book lice.

Psori'asis, a skin disease in which there are at first elevated red patches upon which large scales of epidermis appear, the skin between the patches often cracking and bleeding. The causes are very obscure. There seems to be some connection between psoriasis and the rheumatic habit, or chronic rheumatism.

Psyche (sI'kē), character of Greek romance, accepted as a personification of the human soul. A certain king had three daughters, of

whom the youngest, Psyche, was a marvel of beauty. Venus, jealous of her, commanded Cupid to inspire Psyche with a passion for some frightful monster; but he himself fell in love with her and visited her every night. Her sisters persuaded her that he, whom she had never seen, must be a loathsome creature; but when she brought a lamp and beheld his beauty, her joy caused her to spill a drop of hot oil on his shoulder. He awoke, reproached her, and fled; and she vainly attempted to destroy herself. Venus made her a slave, but Cupid finally delivered her, and she was united to her beloved by Jupiter. In art Psyche is represented with the wings of a butterfly, or as a butterfly itself.

Psychother'apy, the treatment of disease through the medium of the patient's mind. It has been employed in many forms by charlatans and by semireligious bodies, and also by regular physicians occasionally, and its legitimacy and value are now coming to be recognized by the profession generally. In its extreme form—that exemplified in the teachings and practices of Christian Science—it is regarded as all powerful, since matter is supposed to be nonexistent. The fact that cures are regarded as effected directly by the action of God does not essentially alter the situation. Between this extreme and that of totally ignoring or denying the action of the mind in therapeutics, there are numerous degrees of belief and practice. The attitude of the medical profession in general is that of the physician who occasionally treats patients with absolutely neutral preparations, like pills made of bread crumbs. Such preparations, believed by the patient to be soporifics, purges, etc., sometimes act precisely as he expects them to act, but it would be too much, of course, to suppose that they would uniformly so act. The general effect of a peaceful and undisturbed state of mind on a patient is generally recognized; also the fact that violent and sudden emotional crises may be dangerous or even fatal. When the disease itself is mental, mental treatment is, of course, of special value.

Recognizing the peculiar mental effect of religious ideas and associations, a movement for the coöperation of clergyman and physician in certain cases has recently gained much headway, and to this, by some persons, the title of "psychotherapy" is incorrectly restricted. Begun in his own parish by Dr. Worcester, rector of Emmanuel Church, Boston, it is known generally as the "Emmanuel Movement." It has the approval of numerous eminent members of the medical profession, including such men as Dr. S. Weir Mitchell, but it is condemned or deplored by others as an interference by untrained persons with the business of the skilled therapeutist. Among the clerical profession there are somewhat wide divergences regarding the extent to which this form of psychotherapy may be carried, but all agree that it must depend on diagnosis by a physician, who is to be called in first; and that only such cases are to be treated as he pronounces fit for psychotherapy. The clergyman then treats the case by conversation, by authoritative assurances, and by bringing to bear all his resources as a minister of religion. This is evidently mental suggestion, and in some cases the patient would appear to be hypnotized, although the use of hypnotism is disclaimed by most of the clergymen who approve the method. In general hypnotism, though it certainly acts through the mind, is not accounted a method of mental healing proper. See HYPNOTISM.

On the irregular and illegitimate side, many cures attributed to occult or miraculous action are now ascribed by psychologists to mental influence. Among these are the cures of scrofula by royal touch, cures by demented "miracle workers," some of those that undoubtedly take place at shrines where religious pilgrims resort, etc. The possibilities of the method when under professional and scientific control are evidently far from exhausted.

Psychol'ogy, the science of the human mind. Mental life is accompanied by nervous changes. The connection between mind and body is uniform. An emotion, thought, memory, association, sensation may arouse an intellectual train, emotional outburst, or course of action. External or bodily causes, as an odor, a spoken word, a pain, an internal organic movement, may start a train, which may be advanced or hindered by innumerable circumstances or modified by other bodily or mental causes. All together make the complex antecedent state that is the cause, while vague analogies of thought and feeling, such as temperament, heredity, education, make variations between individuals, and the existing condition of the nerve centers makes variations in the same individual.

Experimental psychology seeks to discover general laws which govern mental action and the facts of consciousness by the reconstruction under artificial circumstances of analogous conditions and thus isolate and exhibit a specific cause. Experiments may be arranged for the normal stimulation of the sensory organs, the skin, muscles, and particular senses, under artificial conditions. All cases of brain and nervous disease offer opportunities for observation, the unusual manifestations being changes due to the organic disturbances of the disease. Nature performs the experiment, the only difficulty being the physiological one that cerebral disturbances are often as obscure as the mental states which they are used to explain. All mental changes due to internal organic changes are cases to be classed under physiological psychology. This branch embraces the study of hypnotism, illusions, cerebral localization, and the physiology of the brain and nerves. It aims to discover the connection between mind and body and to propose theories of the central nervous processes connected with thought and feeling. The methods are mainly those of experimental physiology, and the most direct aid is furnished by the results of experiments on live animals. It has contributed valuable discoveries that are put to much practical use.

Race psychology deals with the mental traits of peoples and the intellectual development of

mankind. It studies mind in its social characteristics and in the development of government, religion, customs, and institutions. It examines into the origin and growth of philosophies, cults, literatures, laws, traditions, and other elements of culture, and collects and compares reports regarding savage and degenerate peoples.

Comparative psychology applies itself to the study of animals, for they show striking evidences of the phenomena of consciousness in its lower and some of its higher manifestations. It seems destined to throw much light upon human psychology, just as comparative anatomy has upon human physiology. As with many physical functions, certain intellectual states are seen in animals less developed and complex or more acute and predominant than in man. Instinct is more perfect in animals, memory is often remarkably developed, and certain of their senses show a far higher degree of acuteness than the corresponding human senses.

Infant psychology reveals mental facts at their origin and in their simplest form. At the outset the child's mind is lower than the mind of the higher animals, since its human attributes have not yet expanded and its instinctive equipment is behind that of many animals; but in its rapid development it exhibits the unfolding of mental growth in correspondence with bodily growth, an advantage not afforded in other fields of observation.

Abnormal psychology looks to abnormal or diseased conditions of mental life for light upon its nature and normal activities. It includes all cases of variation from the natural and healthy workings of the conscious mind, such as sleepwalking, dreams, loss of memory, loss of the power of speech, hallucination, hypnotic suggestion, idiocy, and all forms of mental alienation. Such cases offer opportunity to apply the logical method of difference by removing a part of the cause or effect and noting the consequent variations in the corresponding effect or cause. This procedure helps to attach to effects their true causes. A person deprived of one of the senses from birth is an admirable subject for the application of this method. Society psychology investigates the laws of human feeling, volition, and action when manifested in crowds, whether orderly or riotous, and in organizations, whether their objects are lawful or criminal.

Introspective psychology is the method of the older psychologists, who proceeded by direct observation of the events of the individual consciousness. The consciousness of the normal self is indeed the touchstone of all psychological knowledge. Cognizance of the subjective self, the primary memory of experiences as they pass, and reflection on the facts that have impressed themselves on the mind are the stages of internal observation. The subject who is conscious and objects of which he is conscious are presupposed in all systems of psychology. Images are impressed upon the mind in proportion to the intensity and persistence of the outer stimulus and the affection or attention of the subject. The conditions determining the reproduction of images, their suggestion by association or by spontaneous mental action, and the conditions controlling the sequences and combinations of trains of ideas, their interruptions and digressions, have been subjects of much speculation and experiment. Impressions left from past experiences, all of which leave a trace, create a disposition which modifies and controls subsequent experiences. Automatic and self-registering instruments of great delicacy and complexity have been devised for testing qualitatively and quantitatively variations in the responsiveness and acuteness of sight, smell, taste, hearing, and feeling, and of the memory and other mental functions. Attention, will, action, esthetic sense, and emotion have been subjected to experimental treatment or comparative study.

Applied psychology consists in the practical application of psychological principles in education, and has already led to the replacing of artificial by more fruitful natural methods of studying and teaching.

Psychosis (sī-kō'sĭs), a mental state considered as subject for investigation, generally in connection with the accompanying nervous condition of neurosis, which accompanies it.

Ptah (tä), "father of the gods"; supposed oldest of Egyptian deities; worshiped in Memphis from the first dynasty on; represented in the form of a mummy, with head and hands free. In his hands was the scepter, the symbol of power, and beneath his feet was the symbol of truth. Among several composite forms in which he appears was that of Ptah-Sokar-Osiris, the god of the resurrection and of the nether world. In this form he was regarded as the first King of Egypt and as creator of the world.

Ptarmigan (tär'mĭ-găn), any grouse of the genus *Lagopus* the members of which are distinguished by the legs being densely feathered to the claws. Ptarmigans are characteristic of

European Ptarmigan—Winter Plumage.

the high N. regions of the globe, and, with the exception of one species, assume a white coat during winter; in summer they are of a more or less reddish or brownish gray. A number of species have been recognized, of which *L. albus*

inhabits both hemispheres, *L. rupestris* and *L. leucurus* N. America, and *L. mutus*, *L. hemileucurus*, and *L. scoticus* the Old World.

Pteran'odon, genus of pterodactyls, or extinct flying reptiles, from the Cretaceous of Kansas, distinguished from all previously known genera of the order by the entire absence of teeth, and hence regarded as the type of a suborder, *Pteranodontia*. The typical *P. longiceps* has the skull about 30 in. long and the lower jaw nearly 2 ft. *P. comptus* is a small species, while *P. ingens* was very large, and the skull must have measured nearly 4 ft.

Pteroc'lidæ, small family of birds peculiar to the Old World, containing the so-called sand grouse; birds about the size of pigeons and intermediate in structure between them and the grouse, although the balance of characters is rather in favor of the pigeons. Two genera are recognized by authorities—(1) *Pterocles*, with about fifteen species, and (2) *Syrrhaptes*, with two. They are found in Africa and Asia, in dry, sandy places or deserts, rocky plains, and wooded grounds.

Pterodactyl (tĕr-ō-dăk'tĭl), Greek, "wing" + "finger," any one of a group of extinct flying animals, confined to the Mesozoic or Reptilian age, and usually regarded as an order of reptiles. The anterior limbs were adapted for flight by the elongation of the forearm and fifth or outer digit, corresponding to the little finger of the human hand. By this means an

PTERODACTYL.

expanse of membrane was supported as in the bats. The head was large, jaws long, and in most forms armed with teeth. In many points the skull approached that of birds. The bones were thin and filled with air, like those of birds. The skin seems to have been destitute of scales or feathers. The earliest pterodactyl yet known is *Dimorphodon macronyx* from the Lower Lias of England. Many species occur in the Oölitic lithographic slates in Bavaria. The gigantic species from the Upper Cretaceous shales of Kansas were destitute of teeth. The largest of them (*Pteranodon ingens*) probably measured between the tips of the fully expanded wings nearly 25 ft.

Pterylog'raphy, branch of ornithology which treats of the arrangement of the feathers of birds. The science originated with Nitzsch, who first showed that not only are few birds evenly clad with feathers, but that the feathers are disposed in definite tracts, or pterylæ, between which are bare spaces, apteria, and that the arrangement of these tracts and apteria differs in and is characteristic of various groups of birds.

Ptolema'ic Sys'tem, name generally applied to the ancient system of astronomy, because the only systematic description of it extant is found in the "Almagest" of Ptolemy. The fundamental doctrines of the system are: (1) The earth is a globe. (2) The celestial sphere, with all the heavenly bodies, performs a revolution around the earth every day, on an axis called the axis of the world. (3) The earth is in the center of the celestial sphere. (4) The celestial sphere is so much larger than the earth that the latter is a mere point in comparison. (5) The earth has no motion of translation, but remains at rest in the center of the sphere. (6) The planets are arranged in the following order from the earth: the Moon, Mercury, Venus, the Sun, Mars, Jupiter, Saturn. (7) The moon and sun revolve around the earth in eccentric circles—that is to say, in circles whose center does not coincide accurately with the center of the earth. Mercury, Venus, Mars, Jupiter, and Saturn do not move uniformly around the sphere, but move around the circumference of an epicycle, whose center does not move uniformly. The epicycle was intended to account for the alternate, direct, and retrograde motions of these planets, which we now know to be due to the revolution of the earth around the sun. See ASTRONOMY.

Ptolemy (tŏl'ĕ-mĭ), name of thirteen kings of Egypt, forming the thirty-third dynasty, who ruled for nearly three centuries, from the death of Alexander of Macedon till the Roman occupation (323–30 B.C.). The period, in its earlier portion, till the death of Ptolemy III (221 B.C.), was one of considerable splendor, rivaling that of previous dynasties. The policy of employing Greek mercenaries was continued, and they grew to be the ruling class. The dominant spirit was Greek, not Egyptian. The royal residence was at Alexandria, whose population was mainly foreign, and that city became the center of Greek culture and science. The most important follow:

PTOLEMY I (SOTER), d. 283 B.C.; King of Egypt; reputed son of Lagus; hence the name *Lagides* given to the dynasty he founded; was one of Alexander's most trusted generals, and at the partition of the empire received the governorship of Egypt, 323 B.C.; was nominally tributary to the Macedonian power till 306, when he became the actual king, assuming the titles of the Pharaohs; reigned till 284. By a victory of the allies over Antigonus at Ipsus, 301, Palestine, Phœnicia, Syria, and Cyprus were added to his kingdom. He established the administration and commerce of Egypt; inaugurated the great library and school at Alex-

andria; named SOTER ("the preserver") by the Rhodians, whom he aided against Demetrius, 305–4.

PTOLEMY II (PHILADELPHUS), 309–247 B.C.; son of preceding; b. island of Cos; succeeded his father, who abdicated in his favor, 285; extended trade, built roads, canals, and cities; added to the schools and library of Alexandria. It was during his reign that the Greek version of the Old Testament is supposed to have been made, in part at least. PTOLEMY III (EUERGETES), d. 222 B.C.; son of preceding; ascended the throne, 246; extended the limits of his kingdom to the NE., it is said, even to the Indus; also made conquests in Arabia; was an intelligent patron of learning. He received the name EUERGETES ("the benefactor") because he restored to Egypt the gods which Cambyses had carried away. PTOLEMY IV (PHILOPATER), d. 205 B.C.; son of preceding; began to reign, 222; nicknamed PHILOPATER ("father-loving") because he was believed to have poisoned that parent; lost some of his possessions in Asia, wrested from him by Antiochus III, but defeated Antiochus at Raphia, near Gaza, 217; cultivated the friendship of the Romans by sending grain to Rome during the second Punic War; murdered his mother, brother, and his uncle Lysimachus.

PTOLEMY V (surnamed EPIPHANES, "the illustrious"), d. 181 B.C.; son of preceding; succeeded him at age of five, his mother being regent; became the ward of the Roman Senate, 201. Antiochus of Syria and Philip of Macedon invaded his dominions and conquered several provinces, but the Romans interfered, and peace having been made, Ptolemy married, 192, Cleopatra, daughter of Antiochus. He was crowned 195, and the Rosetta Stone was erected in his honor. PTOLEMY VII (EUERGETES II, surnamed PHYSCON, "big belly"), d. 117 B.C.; younger son of Ptolemy V; reigned conjointly with his brother Ptolemy VI, 170–165; then quarreled with him, and was compelled by the Roman Senate to take Cyrene as a separate sovereignty; was under Roman tutelage till 146. He usurped the throne on his brother's death, having put to death the legitimate heir, Ptolemy Eupator; was driven from Alexandria by his subjects and took refuge in Cyprus, 130; recovered the throne, 127.

Ptolemy, Claudius, Helleno-Egyptian mathematician, astronomer, and geographer; flourished at Alexandria in the second century A.D. Little of his life is known. His "Great Astronomical Construction," or "Syntaxis Mathematica," contains nearly all that is known of the astronomical observations and theories of the ancients. The Ptolemaic system, based on the theories of Hipparchus, which places the earth in the center of the universe, was universally received till the time of Copernicus. But for the Arabians the "Syntaxis" would probably have perished. It was translated by them in the reign of Caliph Al-Mamoun (abt. 827), and handed down under the title of "Almagest." As a geometer, Ptolemy has been ranked as certainly the fourth among the ancients—after Euclid, Apollonius, and Archimedes. He wrote a universal geography, which continued to be the standard text-book till the sixteenth century. He was the first to use the terms latitude and longitude, and he proved the earth to be a globe. The maps of this geography have been preserved with it. He was distinguished also as a musician, and wrote treatises on music, mechanics, chronology, and astrology.

Ptomaines (tō'mă-ĭnz), certain substances found in the process of putrefaction. Some of these are extremely poisonous, while others are harmless, or nearly so. Nencki, in 1882, first isolated a definite substance from the products of putrefaction, starting with gelatin. Later, probably the same substance was obtained from putrid fish. Other basic products were subsequently obtained from putrid meat and fibrin. Among the ptomaines described by Brieger the following may be mentioned: Cadaverine, putrescin, peptoxin, muscarin, and mydaleine. Ptomaines are the products of the vitality of microörganisms, and this discovery is plainly of the highest importance to the science of medicine. It was formerly held that many diseases are due directly to the presence of microörganisms in the body, but now it appears that, in some cases at least, these organisms act indirectly by secreting poisons, which are the immediate cause of the disturbance of the normal functions.

Pto'sis, a dropping of one or rarely both upper eyelids; an inability to open the eye. It may come from a degenerate or undeveloped condition of the muscle tissue, or from palsy of the third nerve which controls the muscle of the upper lid. It has been successfully treated by tacking the orbicular muscle to the occipito-frontal. It often passes away without surgical treatment, and there are cases which are not benefited by any treatment whatever.

Pub'licans, in ancient Rome, taxgatherers, farmers of the revenue, who, on payment of a stipulated sum, obtained the privilege of levying taxes within certain districts. The extortion to which their avarice or the high price paid for the privilege often gave rise made these taxgatherers a detested class, especially in the conquered provinces, as in Judea, where the contempt felt for them by the Jews appears from many passages in the New Testament. The right to farm the revenue was sold at public auction for a period of five years.

Public'ola, Publius Valerius, Roman lawgiver of the semihistorical period of the foundation of the republic. He is said to have borne a prominent part in the expulsion of the Tarquins. After the compulsory resignation of Collatinus he was elected consul in his place (abt. 509 B.C.), and acquired the surname of Publicola or Poplicola ("the people's friend") by his deference to public sentiment. He brought forward laws for the establishment of the republic, one of which declared that whoever attempted to make himself king might be killed by anyone. He was afterwards thrice elected consul; and the expedition of Porsena is placed during his term of office.

Pub'lic Lands. See LANDS.

Pub'lius Sy'rus, Latin comic poet, who flourished at Rome abt. 44 B.C. He improved the mimic art, and it is said by St. Jerome that a collection of moral sentences from his farces was a schoolbook at Rome. The collection extant under the title of "Publii Syri Sententiæ" is from various sources.

Puccoon', or **In'dian Dye,** general name applied in the U. S. to several dissimilar plants which yield a yellow or reddish juice, often utilized for dyestuffs; best-known representatives, species of *Lithospermum* (*L. hirtum, L. canescens,* etc.), of the borage family. In many places the bloodroot (*Sanguinaria canadensis*), of the poppy family, bears this name. *Hydrastis canadensis,* of the family *Ranunculaceæ,* is the yellow puccoon.

Pückler-Muskau (pük'lĕr-mŏs'kow), **Hermann Ludwig Heinrich** (Prince of), 1785–1871; German author; b. Muskau, Silesia; served in various armies; was made prince by the King of Prussia, 1822; laid out magnificent parks at Muskau and Branitz, in Lusatia; and became famous for his accomplishments and eccentricities; principal works, relating chiefly to his extensive travels, include his celebrated "Letters of a Defunct," English translation by Mrs. Sarah Austin; "The Travels of a German Prince in England," "Tutti Frutti," "Semilasso in Africa."

Pudici'tia, Roman personification of female purity, the virtue *par excellence* of womanhood, as bravery was that of manhood. From early times there was a temple to this goddess in the Forum Boarium, to which, however, only women of patrician families were admitted, though somewhat later a shrine to *Pudicitia plebeia* was established for women of plebeian origin.

Puebla (pwĕb'lä), state of Mexico; between Tlascala, Hidalgo, Vera Cruz, Oajaca, Guerrero, Marelos, and Mexico; area, 12,204 sq. m.; pop. (1900) 1,021,133; capital Puebla; entirely included in the region of the plateau, most of the surface consisting of plains or rolling lands, with an average elevation of about 6,500 ft., but these are varied by groups of hills or mountains and, toward the S., by deep valleys. The beautiful "Mexican onyx," a variety of alabaster, comes principally from this state, and many varieties of marble are quarried. The manufactures, especially of cotton and woolen goods and of pottery, are considerable.

Puebla, capital of Mexican state of same name; on the plateau, near the confines of Tlascala and the Malinche Mountain; 7,200 ft. above sea; is clean and healthful, but, aside from the fine cathedral and churches, there are few pretentious buildings. Two parks and a large number of public squares add to the beauty of the place. It is noted for its manufactures of cotton and woolen cloths, etc., and for the onyx and marble quarries of the vicinity. Puebla was founded as a mission village by the celebrated Toribio, 1532. The U. S. troops under Scott had their headquarters here June–August, 1847. Later it was a noted center of the clerical party, and was twice besieged and taken by Comonfort, 1856–57. The French, on their first advance, were repulsed from Puebla, May 5, 1862, in a battle which is annually celebrated under the name Cinco de Mayo; they captured it, May, 1863. Pop. (1900) 93,521.

Pueb'lo, capital of Pueblo Co., Col.; on both sides of Arkansas River; 45 m. S. of Colorado Springs; in an agricultural, mineral, and stock-raising region; has the largest iron and steel works between the Missouri River and the Pacific coast, several of the largest smelters in the world, blast furnaces, rolling, blooming, planing, and nail mills, brass and iron foundries, lead-pipe works, large stockyards and slaughtering and packing plant, and many minor manufactories. Within a radius of a few miles are thirty oil wells. The city contains the State Asylum for the Insane, grounds and buildings of the State Agricultural Society, Colorado Mineral Palace for permanent exhibition of state's mineral resources, collegiate institute of the Methodist Episcopal Church, Roman Catholic academy, and several charitable institutions. Pop. (census of 1910) 44,395.

Pueblo In'dians, tribes of semicivilized Indians, found by the Spaniards early in the sixteenth century in what is now New Mexico, and later by Americans in both New Mexico and Arizona; lived in permanent villages (Spanish, pueblos), whence their name. They were then as advanced as they now are, raising grain, vegetables, and cotton, which they spun and wove, and made pottery. Their houses are mostly of adobe, generally large, of several stories, and contain many families. The lower story is without openings, entrance being effected by ladders. The recent dwellings, since the fear of wild tribes has disappeared, are commonly of one story and are entered from the ground. The principal existing tribes, which differ in language, are the Zuñis, Toltos, Teguas, Queres, and Jemes. Over 2,600 Moquis Pueblos are at the Navajo Agency, Ariz., and about 9,500 Pueblos at the Pueblo and Jicarilla Agency, N. M.

Puer'peral Fe'ver, a continued fever, formerly supposed to be specific, appearing in puerperal women between the second and sixth days after delivery. The condition is initiated by a chill, followed by fever, uneasiness, nausea, abdominal tenderness or pain, diarrhea, prostration, and sometimes by delirium. The disease runs a rapid course, usually terminating fatally within a week, the patient dying from exhaustion.

Puerperal fever is a septic disease that is always due either to infection from some microörganism that finds an ingress into the system through the tissues that are lacerated and bruised during labor, or to infection by the attendant, instruments, etc. There should be no deaths from puerperal fever in properly attended obstetrical cases, in which absolute cleanliness of the midwife's hands and of all things coming in contact with the patient are secured.

Puerperal Insan'ity, perversion of the mind in women immediately after childbirth, although it may also occur before delivery, or weeks or months after labor, when excessive nursing has undermined the strength. It may therefore be considered as a derangement of the mind due to the influences of the childbirth upon the nervous system and emotional nature of the mother. Puerperal insanity may be characterized by mental agitation or excitability, or, reversely, the patient may sink into a state of mental apathy, moodiness, reticence, or despondency. There will be restlessness, inability to sleep, headache, impaired appetite, coated tongue—in some cases an increase of temperature. In the delirious form and in the melancholic form there is equally an aversion to the father or the child. The prognosis is favorable; the mind in most cases is, in time, restored to a normal condition.

Puerto Cabello (pwĕr'tō kä-bĕl'yō), principal port of State of Carabobo, Venezuela; on peninsula, which, with a chain of small islands and reefs, forms a secure and commodious harbor admitting the largest vessels; is the most important in Venezuela after La Guayra; principal exports, coffee, cacao, dye woods, hides, and copper ores. The port was strongly fortified in the eighteenth century, and repulsed the attack of a British fleet. During the war for independence it changed hands several times, and was the last stronghold taken from the Spaniards, 1823. Pop. abt. 14,000.

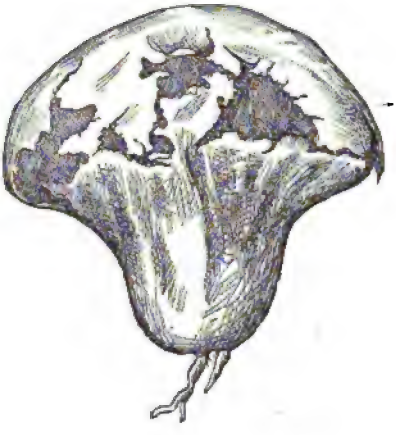
Puerto Ri'co. See PORTO RICO.

Pueyrredon (pwā-ĕ-rā-thōn'), **Juan Martin,** abt. 1780–1845; Argentine military officer; b. Buenos Ayres; chosen supreme director of the united provinces of La Plata, July 9, 1816. His efficient support of San Martin resulted in the independence of Chile. He resigned, June, 1819.

Pufendorf (pō'fĕn-dŏrf), **Samuel** (Baron von), 1632–94; German jurist and historian; b. near Chemnitz, Saxony; published anonymously at Geneva, 1658, "Elements of Universal Jurisprudence"; Prof. of Law of Nature and of Nations at Heidelberg, 1661–70; published, 1667, "On the State of the German Empire," denouncing the house of Austria and exposing the inherent weakness of the Holy Empire; to avoid the consequences, accepted a professorship at Lund; there, 1672, published "Of the Law of Nature and of Nations"; was royal historiographer at Stockholm, 1677–88; made baron; entered the service of the Elector of Brandenberg, 1688.

Puff Ad'der, deadly serpent (*Clotho arietans*) of S. Africa, deriving its popular name from its habit of puffing up the neck when irritated.

Puff'ball, plant of the family *Lycoperdaceæ* and order *Gasteromycetœ*, in which the dust-like spores escape in a cloud when the ripe spore fruit is suddenly compressed. They grow on the ground or on decaying stumps, logs, etc., and are abundant in all temperate and warm climates. The proper plant of a puffball consists of a mass of white branching threads (often called the mycelium) which creep through the soil or decaying matter, gathering food and moisture for its nourishment. After a time there appear on the plant at various points small rounded bodies, the young spore fruits, consisting of compacted threads. These bodies grow rapidly, and eventually emerge from the ground. When young there is little differentiation in the tissues of



PUFFBALL.

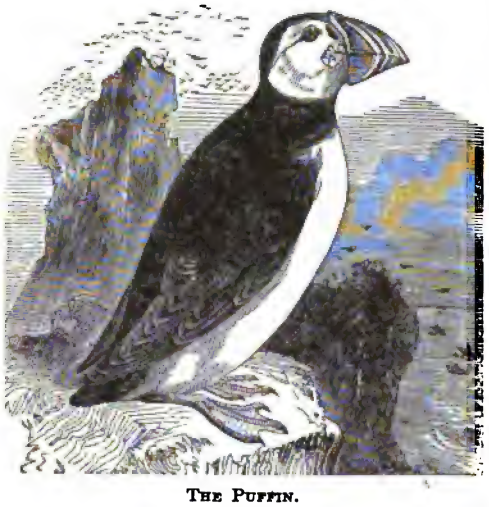
the spore fruits, but as they grow the outer layers become modified as a boundary tissue (*peridium*), more or less separable into an outer and an inner stratum, while the interior differentiates into (1) a sterile and (2) a spore-bearing portion (*gleba*), the former constituting the base or supporting part of the spore fruit, while the latter fills the upper, usually enlarged part.

Puff Bird, any member of the *Bucconidæ*, a family of small birds having large heads and stout bills, peculiar to the tropical or warmer

PIED PUFF BIRD.

regions of America. They are mostly of dull disposition, sitting motionless for a long time with their feathers erected, looking as if they were puffed up.

Puf'fin, any bird of the auk family (*Alcidæ*), belonging to the genera *Fratercula* and *Lunda*, which are characterized by high, compressed, highly colored bills. The best-known species is the common puffin, coulterneb, or sea parrot (*F. arctica*), found abundantly on both sides of the Atlantic. This bird is about a foot long, black above, white below, with a gray face and black collar about the neck.



THE PUFFIN.

The Arctic puffin breeds in burrows and lays a single white egg with a few faint gray markings at the large end. A closely related species (*F. corniculata*), known as the horned puffin, from the rather long outgrowth on the upper eyelids, occurs in the N. Pacific, as does also the tufted puffin (*Lunda cirrhata*), a rather larger bird with a long tuft of yellowish feathers curving backward from above either eye.

Pug, small, short-haired, short-muzzled breed of dogs, represented by at least three varieties, probably derived from the bulldog. The head should be massive, forehead wrinkled, eyes large and prominent, body short and wide, tail tightly curled. Color fawn with black muzzle and a dark spot on forehead, and dark lines down the back. The pug is a stupid but good-natured dog.

Puget (pū-zhā'), **Pierre,** 1622–94; French painter, sculptor, and architect; b. Château-Follet, near Marseilles; worked as a carver in wood in Florence; as an architect in Marseilles, where he designed the new Hôtel de Ville; at Genoa, where he designed palaces and produced important sculptures and paintings; 1668–70, was employed at Toulon in the artistic decoration of government ships; later did architectural and other work at Marseilles, Toulon, and other cities. The Louvre Museum contains several of his sculptures.

Puget (pū'jĕt) **Sound,** arm of the Pacific, extending S. from the Straits of Juan de Fuca, in State of Washington, and between the Coast Range Mountains on the E. and the Olympic Mountains on the W.; one of the most beautiful sheets of water in the world; 100 m. long, has a coast line of 1,600 m., and an area of 2,000 sq. m.; has very many bays, coves, islands, channels, and inlets; is very deep even abreast of the shores, and forms of itself a magnificent harbor, though lacking in good anchorages on account of its depth; tide varies from 9 ft. at the N. to 15 in the narrow inlets at the extreme S. Along its shores lie Seattle, Tacoma, and Olympia, with many other rapidly growing places. The entrance to the sound is dominated by the British naval establishment of Esquimault; but the U. S. has a naval station at Port Orchard, 16 m. S. of Seattle.

Pulas'ki, Casimir (Count), 1748–79; Polish military officer; b. Lithuania; son of Count Joseph Pulaski, who, 1768, formed the Confederation of Bar for the preservation of the liberties of Poland; in 1769 joined the national struggle against the despotism of King Stanislaus Augustus; was for some time commander of the insurgents, and made a bold attempt to seize the king in Warsaw. Being outlawed on the failure of this attempt, he escaped to Turkey, 1772; participated in a war against Russia; went to France, 1775, where he made the acquaintance of Franklin, and offered his services to the cause of American independence. Arriving at Philadelphia, 1777, he joined the army as a volunteer; distinguished himself at the battle of Brandywine; appointed by Congress brigadier general, and given command of the cavalry; took part in the battle of Germantown; formed at Valley Forge, 1778, an independent corps of lighthorse and infantry called Pulaski's Legion, officered chiefly by foreigners. In February, 1779, he set out for the South; reached Charleston, May 8th; made a vigorous but unsuccessful attack on the British advance guard, May 11th; was given command of the French and American cavalry; in the siege of Savannah was mortally wounded in the assault of October 9th; was carried on board the U. S. brig *Wasp* in Savannah, where he died; was buried at sea.

Pul'kowa, village near St. Petersburg, Russia; 10 m. N. is the famous Nicholas Central Observatory, founded by the Czar Nicholas, 1838–39. The Pulkowa Observations are published by the Academy of St. Petersburg. One of the largest telescopes in the world, a 30-in. refractor, was erected here, 1882.

Pull'man, George Mortimer, 1831–97; American inventor; b. Chautauqua Co., N. Y.; became first a cabinetmaker, then a building contractor; removed to Chicago, 1859; invented the Pullman palace car, and, 1863, began building the cars that have since borne his name; organized, 1867, the Pullman Palace Car Co., and was its president till death; devised the vestibule train, 1887; founded a model factory town of Pullman, near Chicago, 1880.

Pulmona'ria. See LUNGWORT.

Pulmona'ta, or Pulmonif'era, order of Gasteropod mollusca in which gills are absent, the animal breathing air by means of a "lung" formed by the ramifications of the blood vessels

on the surface of the mantle cavity; embraces the common snails and slugs, and all its members live either on the earth or in fresh water. Two suborders are recognized—the *Stylommatophora*, in which the eyes are placed on the tips of the tentacles, and these last are capable of being retracted by an inversion like the pushing in of the finger of a glove; and the *Basommatophora*, in which the eyes are at the base of the nonretractile tentacles. Most prominent of the first group is the family *Helicidæ*, embracing the common snails, of which about 5,000 species have been described.

Pul'qué. See AGAVE.

Pulsatil'la. See ANEMONE.

Pulse, general name for such seeds of leguminous plants as are used for human food. All kinds of pulse abound in vegetable caseine, and all are highly nutritious. Beans, peas, and lentils are the most important kinds of pulse.

PULSE, the result of the blood wave sent through the arteries of the body by the ventricles of the heart. Each contraction of these ventricles sends into the arteries 2 to 4 oz. of blood, which, entering vessels already full but contracted, expands, elongates, and uplifts them, and produces a sudden lifting and impulse on the finger applied to them. This impulse is equal in all the arteries of equal size throughout the body, but the physician usually examines it on the thumb side of the wrist (in the radial artery), because there the vessel is near the surface, resting on bone, and its varying movements can be best appreciated. The frequency of the pulse in a healthy adult, at rest, is 72 to 75 beats a minute—in women a little more frequent than in men; more frequent while standing than while sitting, least frequent in the recumbent position. But a slow pulse is sometimes found in healthy, strong persons; 40 or 45 is not an uncommon rate; in one instance no more than 20. At birth the normal frequency is 140; in youth, 90; and in old age, 70. Muscular exertion, certain mental states, as surprise, anger, or a sudden sense of danger, will produce great increase in its frequency.

The condition known as tachycardia (see HEART DISEASE) not rarely occasions pulsations of 250 or 300 per minute.

The pulse may be small or full, rapid or slow, hard or soft, quick or prolonged; or it may be irregular in various ways, giving a varying number of beats in the different fractions of a minute, the beats tumultuous, frequent, and slow alternately, or sometimes double (*dicrotic*). It is often intermittent—that is, a single beat is lost. This occurs both with and without disease of the heart; it is often caused by the use of tobacco. Many conditions of the pulse can be inscribed on paper attached to a revolving cylinder by means of the sphygmograph (*q.v.*).

The arterial pulsations in the horse are from 32 to 38 in the minute; in the ass, from 45 to 48; in oxen and cows, 35 to 42; in sheep, 70 to 77; in the dog, 90 to 100. These countings were made when the animals were at rest. See CIRCULATION.

Pulsom'eter, pump in which the pressure of steam acts directly on the surface of water in a closed chamber, forcing the water through a pipe to a higher level; then the steam condenses and refills the chamber by suction.

Pulteney (pŭlt'nĭ), **William,** Earl of Bath, 1682–1764; British statesman; b. England; entered Parliament as a Whig, 1705; defended Walpole in the prosecution, 1712; Privy Councilor and Secretary of War, 1714–17; went over to the opposition, 1725, and wrote bitter political pamphlets against Walpole; on downfall of latter was real framer of the cabinet of 1742; created Earl of Bath at this time. He entered the House of Lords, losing influence thereby; was premier for two days in February, 1746.

Pu'lu, or Veg'etable Silk, richly beautiful fiber produced by tree ferns of the genus *Cibotium*, growing in the Malay and other Pacific islands; is a very useful styptic, and is used as such by Dutch surgeons.

Pu'ma, common name for *Felis concolor*, a large member of the cat family (*Felidæ*) inhabiting America; also known as panther, mountain lion, lion, tiger, and—in books at least—as cougar and catamount. It is of a general reddish gray, or tawny, above, whitish beneath, end of tail dusky, outside of ears and a spot on either side of the muzzle black. The

PUMA.

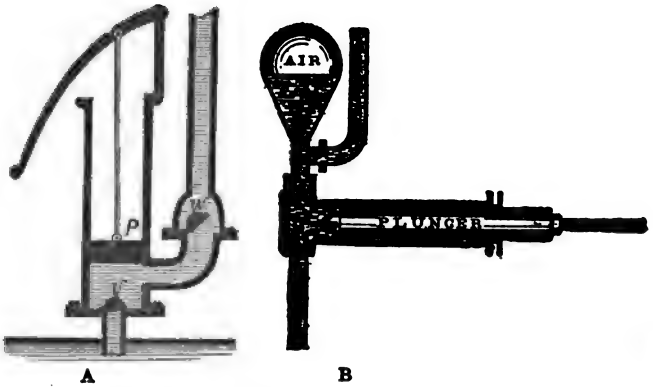
young are spotted. Next to the jaguar, the puma is the largest cat of the New World, attaining a length of 8 ft. and a weight of 200 lb., although individuals of this size are very rare. It is found from Patagonia to 60° N. lat., from Maine to California, and throughout S. America up to a height of 9,000 ft. on the Andes. The puma is ordinarily a cowardly animal, but when wounded or brought to bay it is dangerous.

Pum'elo, or Pomelo. See SHADDOCK.

Pum'ice. See OBSIDIAN AND PUMICE.

Pump, hydraulic or pneumatic machine for elevating water or other liquids, or for forcing fluids through a pipe or passage. The height to which water is raised by a pump is called the "lift." Pumps sometimes act not by rais-

ing water, but by forcing it into a vessel against a pressure, as in the case of the feed pumps of steam boilers. Pumps for operating on air are known as air pumps, air compressors, blowers, etc. Power may be applied by a piston moving to and fro in a cylinder, or by a wheel revolving in a box. Rotary pumps, in which the latter method is used, may be simply force pumps or suction and force pumps, the power being applied by direct pressure or revolve as indicated by the arrow. The water is carried around in the spaces between the teeth. The close meshing of the teeth prevents its return between the gears, and it is forced through the discharge pipe, entering the case through the supply pipe under the action of atmospheric pressure. No valves are necessary with this pump, though a valve in the suction pipe is convenient to prevent the pump from running down.



A B

Fig. 1.—Force Pumps.

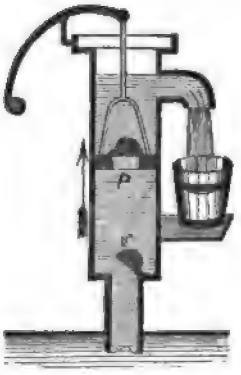


Fig. 2.—Common Suction Pump.

by centrifugal force. It is usual to denominate them rotary force pumps and centrifugal pumps. The cylinder and piston force pump is shown in Fig. 1, A. When the piston *P* is raised, water will rush into the chamber through *v*, and when the piston is depressed this valve will close, while the valve *w* will be raised by the water, which is forced up into the pipe *d*. On raising the piston again, the pressure being removed from beneath the valve *w*, the weight of water above will cause it to close and thus prevent any return.

The functions of the common suction pump depend on the relative pressure of a column of water within the pipe and that of the atmospheric pressure on the water outside of it. Atmospheric pressure is capable of sustaining, under ordinary conditions, a column of water 33.8 ft. high. Consequently, if the lower end of a vertical tube of sufficient length is immersed in water and the tube completely exhausted of air, the water will rise 33.8 ft. above its level in the reservoir. The action of the common suction pump will therefore be understood. By a slight change in the form of the suction pump, and the addition of a valve in the discharge pipe, the lift pump is produced, and water may be raised to a height corresponding to the amount of power applied. Removing the lower valve and immersing the pump till the upper valve in the piston is below the surface of the external water, the machine becomes simply a lift pump. If a solid piston head is placed above the discharge pipe, it will, when moved downward, force the water through the additional valve, and technically it then becomes a force pump.

The rotary pump consists of two gear wheels with large and long teeth, closely fitting each other and the case in which they revolve. They

Pump'kin, any plant of the genus *Cucurbita*, of the gourd family. There are three species of this genus in common cultivation: *C. pepo*, *C. moschata*, and *C. maxima*. These species are probably native to the New World. The first one is the pumpkin of N. America. The summer or warty crook-neck squashes and the bush scallop and patty-pan squashes are of this species, and here belong, also, the common inedible ornamental gourds, as this term is understood in the U. S. The second species is the parent of the large, striped winter or Canada crook-neck squashes, and the Cushaw pumpkins

Field Pumpkin.

or squashes. To the third species belong the turban and the true winter squashes, like the Hubbard, Marblehead, Essex, Boston Marrow, etc. The larger type of fruits of this species are known as pumpkins in Europe, while they are called squashes in the U. S. In Great Britain the word gourd is used generically for all three species.

Pun, kind of play on words, in which a word is capable of being understood in two or more quite different senses, the combination of which, or the mental change from one to the other, presents an odd idea, generally a ludicrous one. Punning is usually considered the lowest species of wit, being in general purely mechanical in character. The figure of speech called *paronomasia* by writers on rhetoric, and defined by them as "the use of words in the same connection which are similar in sound, but dissimilar in sense," is simply punning. This was a favorite form of expression among the Hebrews, and the books of the Old Testament, in the original, abound in examples of it.

Pu'na, or **Despobla'do,** in Peru and Bolivia, any very high, arid, and uninhabitable tableland; synonymous with *páramo,* used in Colombia. In a special sense, a high plain between two subchains of the Cordillera, extending from about lat. 13° S. southward into Bolivia.

Puna (India). See POONA.

Punch, or Punchinel'lo, kind of puppet show exhibited in the streets of European cities, especially of Italy. It origin has been obscurely traced to the Atellan farces of ancient Rome, but in its present popular form the drama is ascribed to Silvio Fiorillo, an Italian playwright who flourished about 1600. The actors in the performance are wooden puppets, of whom the principal are Punchinello (in English Mr. Punch), his wife (called in English Mrs. Judy), and their dog Toby. The puppets are moved by the exhibitor, who puts his hands under the dress, making the second finger and thumb serve for the arms, while the forefinger works the head; he also supplies a comic dialogue, varying his voice to suit the different characters. The French sometimes employ a cat instead of the dog Toby. Puppet shows of an essentially similar character, but often much more elaborate, are common in China and Japan.

Punctua'tion, act or art of dividing literary composition into sentences and parts of sentences to show grammatical or sometimes rhetorical relations, and thus assist the reader in apprehending the writer's meaning. Ancient manuscripts were not punctuated until after 364 B.C., when it became customary to place a mark of separation after each word. The beginnings of our present system are said to date from the time of Manutius (Manuzio), the first of a famous family of Italian printers, who died in 1515. In English writings a period was first used, though without great regularity, to indicate a break of any sort in the composition. In addition to this, a period on the line or above it, sometimes an inverted semicolon, was used in poetry to mark a metrical rather than a syntactical division. Caxton, the father of English printing, used only an oblique line to indicate the divisions of discourse.

The principal marks of punctuation in modern English are the comma, semicolon, colon, period, interrogation, and exclamation points, of which the last two are mainly rhetorical. Of these the comma is most frequently and most variously used. Punctuation is to some extent a matter of taste and judgment, rather than of rigid rule. Certain writers seem to aim at using the largest possible number of points; others try to use the fewest points possible. As might be expected, the best punctuation lies between these two extremes. There is also some room for individual preference in pointing. Whether a parenthetical expression should be set off by commas, by the dash, or by marks of parenthesis, is often to be decided by individual taste. The same may be said of the use of the semicolon, some writers using the comma or the period, according as the separation requires the more or less distinctive mark.

Pu'nic Wars, three great wars between the Carthaginians (*Punici*) and the Romans. The first (264–241 B.C.) was a contest for the possession of Sicily, which was finally won by the Romans; the second (218–202 B.C.) was initiated by the capture of Saguntum by Hannibal, who thereupon made his great invasion of Italy, and was closed by the Roman victory at Zama; the third was undertaken by the Romans with the express intention of finally destroying Carthage, lasted 149–146 B.C., and though the city made a most heroic and persistent defense, it was at last utterly destroyed.

Pun'ishment, in criminal law, the suffering or deprivation of the enjoyment of rights which is visited on those who violate the penal law. The object and the methods of administering punishment for crime among crudely civilized peoples are based chiefly on the idea of retribution, or the vindication of the law on the offender, and the expiation of his crime by reparation to the injured person. With the development of the idea of the state and of the duties of the citizen to the state, crime comes to be looked on more as a wrong against the community, and the right to inflict punishment is taken from the individual and vested in the state alone. Punishments inflicted for the protection of society may be divided into those which disable or remove wholly or partially the ability of the criminal; those which are intended to deter him from committing it again; and those which are intended to act as a deterrent to others. The punishments of the first class include such forms as capital punishment, deportation, mutilation, branding, perpetual imprisonment, etc. Punishments of the second class include those which may deter the criminal from the repetition of his crime, either by the reformation of the criminal or by inflicting suffering or some other form of punishment dreaded by the criminal, such as public indignity or great cruelty. Punishments of the third class consist almost wholly in the infliction of cruelty or public disgrace. The principal forms of criminal punishment now in use among civilized nations are as follows: death, perpetual imprisonment with or without hard labor, imprisonment for determinate periods, enforced labor in mines, galleys, etc., banishment to penal settlements, pecuniary fines, and in certain cases the infliction of the lash. The criminal is also often

deprived of political or civil rights belonging to citizenship, such as the electoral franchise, capacity to testify in courts of justice, or to hold office, etc. See JAIL; PRISON.

Punjab', or **Panjab** (Persian, "country of the five rivers"), province in the NW. of British India; bounded N. by the NW. Frontier Province and Kashmir, E. by Tibet and the United Provinces of Agra and Oudh, S. by Rajputana, SW. by Sind, W. by Baluchistan and the NW. Frontier Province; area, 97,209 sq. m.; pop. (1901) 20,330,339; capital, Lahore. It is watered by the Sutlej, Beas, Chenab, Jhelum, and Ravi rivers; divided into about forty native states, of which the most important are Patiala, Bahawulpur, Juid, Nabha, Kapurthala, Maudi, Sirmur (Nahan), and Chamba; chief cities, Delhi, Lahore, Amritsar, Rawalpindi, Multan, and Umballa; has in general a very fertile soil, but is irrigated on an extensive scale, owing to insufficient rainfall; greatest staple, wheat; other large crops, sugar, rice, cotton, and indigo; manufacturing industry largely developed in the chief cities. Inhabitants consist of Hindus of many races, Afghans, and Tibetans; about one half Mohammedan, and greater part of remainder Hindus. In the first Sikh War, 1845–46, Great Britain occupied the territory on the left bank of the Sutlej; in the second, 1848–49, the remainder of the country. A portion of the province was set off, 1901, to form the NW. Frontier Province.

Punt, or **Pun-t**, land on the Red Sea, from which the Egyptians made imports, at first indirectly and afterwards directly, during a large portion of their history, extending from the early dynasties down to Ptolemaic times. During a part of the time regular tribute was rendered in kind to the Pharaohs. Its exact location has been disputed, but the weight of argument seems to favor the view that it lay on the W. side of the Red Sea, or on the S. side of the Gulf of Aden on the Somali coast, especially as Punt is often classed in the monuments with Ethiopia or Cush. It was ordinarily reached from Egypt by way of the caravan route from Koptos to Kosseir through the Hammamat valley, and thence by ship.

Punta Arenas (pōn'tä ä-rā'näs), or **Puntarenas**, capital of comarca of same name and principal port of Costa Rica on the Pacific; on the E. side of Gulf of Nicoya; terminus of Costa Rican railway system; has a shallow harbor, considerable trade, and generally healthful climate. Pop. (1907) 3,194.

Pup'pets. See MARIONETTES; PUNCH.

Purace (pō-rä'sä), highest active volcano of the Andes of Colombia, ESE. of Popayan, Cauca; 15,420 ft. Severe eruptions have several times occurred. It is impossible at any time to enter the crater, owing to the hot and suffocating vapors.

Pura'nas, series of eighteen old traditional stories, chiefly in Sanskrit verse, compiled by an ancient sage named Vyasa, the supposed founder of the Vedanta philosophy. They contain the history of the gods interwoven with every variety of legendary tradition in other subjects. Six of them relate to Brahma, six to Vishnu, and six to Siva.

Pur'cell, Henry, 1658–95; English composer; b. Westminster; appointed organist of Westminster Abbey, 1680; organist of the Chapel Royal, 1682. His sacred works have held their own, commanding the admiration of modern critical opinion. His dramatic and chamber music is also admittedly the work of real genius, despite the change of style, etc., which the centuries have brought about.

Purdue' Univer'sity. See INDIANA UNIVERSITY.

Pure Food Law, an act of U. S. Congress, approved June 30, 1906, in effect January 1, 1907, to prevent the manufacture, sale, or transportation of adulterated, misbranded poisonous, or deleterious foods, drugs, medicines, and liquors. The estimation of standards is intrusted to the Department of Agriculture, Treasury Department, and the Department of Commerce and Labor. In 1908 there were twenty-one laboratories for the examination of products, in addition to the main laboratory at the Bureau of Chemistry of the Department of Agriculture. During 1908 more than 13,000 samples were collected and examined, and about 800 were found adulterated or misbranded. The enforcement of the law is in charge of the Department of Agriculture. The penalty for the violation of the law is a fine not to exceed $500 or one year's imprisonment, or both, for the first offense. The law is applicable to food or drugs introduced into any state from any other state or from any foreign country. See ADULTERATION.

Pur'gatives, substances that produce discharges from the bowels. Many drugs are purgative in sufficient dose, but those available in medicine as cathartics, and in common use, are castor oil, rhubarb, aloes, and calomel—mild agents, causing only fluid stools; certain salts, producing watery discharges, as magnesium citrate and sulphate, sodium phosphate, and potassium and sodium tartrate; and a group of vegetable nature, more or less irritant to the intestines. These are senna, jalap, podophyllum, scammony, colocynth, gamboge, croton oil, and elaterium. Setting aside senna, the others last mentioned are called drastic cathartics, from their irritant properties. There are many other substances which have a mild effect upon the bowels, and are called laxatives. The more prominent of these are magnesia and magnesium carbonate and sulphur among inorganic substances, and cascara sagrada, manna, tamarinds, prunes, figs, and other fruits among vegetable. Purgatives operate partly by quickening the muscular contractions of the intestines, and partly by determining an abundant pouring out of fluid into the intestinal canal. They are used to empty the bowels, and also to relieve congestion of distant organs and to induce the absorption of collections of fluid.

Pur'gatory, according to the Roman Catholic and Oriental churches, a place in which the souls of those who died in the state of

grace suffer for a time, either on account of venial sin or on account of the temporal punishment due to mortal sin already forgiven. Purgatory is not a place of probation, but of expiation. The Roman Catholic Church has committed herself to only two statements about purgatory: (1) that there *is* a purgatory, and (2) that the souls detained there are helped by the prayers of the faithful, and especially by the sacrifice of the mass. See HEAVEN; HELL.

Pur'ging Flax (*Linum catharticum*), an annual plant resembling the common flax on a small scale. It is a native of Europe. It has been used in medicine as a gentle cathartic.

Puri (pō-rē'), town of Orissa; on Bay of Bengal; pop. abt. 30,000; named from an idol of Krishna, the lord of the universe, which it possesses—a wooden block in the shape of a cucumber, whose upper extremity represents a human face of utter hideousness. This idol is in a great and magnificent pagoda, within an inclosure 652 ft. long and 630 broad, containing 120 temples. Hundreds of thousands of pilgrims visit the place every year. On great days of festival the idol is placed on a huge chariot, to which the faithful harness themselves in order to draw the idol from the temple to his country house, a mile distant, yet the journey takes several days. There is no truth in the current story that devotees threw themselves under the wheels of the chariot and were crushed to death. The story originated probably in the accidental deaths which occur. Attendance on the festival is believed by the Hindus to insure their eternal salvation. It is considered a meritorious act to pull the ropes or to fan the god.

Pu'rim, Jewish feast, lasting two days, which falls on the 14th and 15th of the month Adar (February and March), in commemoration of the deliverance described in the Book of Esther.

Pu'ritans, in general, persons who are scrupulous and strict in their religious life; in particular, a body of Christians which arose in England in the sixteenth century, and in spite of persecution rapidly increased in numbers and influence. Those who had fled to Geneva during Mary's reign returned under Elizabeth, adherents of the Calvinistic creed, and with new notions on Church polity. During her reign they came to be called, in derision, Puritans, because they advocated a simpler, purer form of worship, and insisted on a stricter, purer life. As a distinct party they led the opposition to the despotic claims of the first two Stuarts, and established the Commonwealth, and to them England owes some of the best features of her free constitution. The Puritans proper adhered to the Church, striving to mold it to their own views. The Independents, despairing of reforming the Church, insisted on an absolute separation and a new organization. The founders of Plymouth, Mass., were Independents or Separatists; those who founded Massachusetts Colony were Puritans who soon adopted the Church polity of the Plymouth settlers. See PILGRIM FATHERS.

Pur'lin, beam or girder which connects two roof trusses, and upon which rafters are placed to support the covering of the roof.

Pur'ple Med'ic. See LUCERNE.

Purple of Cas'sius, substance formed by adding a tin solution to a dilute solution of gold chloride. The tin solution must contain both stannous and stannic chloride. From recent work it appears highly probable that the substance contains gold in the metallic state. When dry and powdered, the purple of Cassius has a metallic luster. It is used in artificial gems, and for imparting a red, rose, or pink color to porcelain or enamel.

Purple Wood, beautiful plum-colored wood from Guiana, of great strength and capable of a very smooth finish. It is the product of the leguminous trees *Copaifera bracteata* and *C. pubiflora.*

Pur'pura, genus of marine gasteropods. This genus furnished a part of the Tyrian purple dye of antiquity, whence the name. There are numerous living and extinct species.

Purpura, condition in which spots of deep purple color appear in the skin, produced by the escape of blood from the vessels. Purpura is not a disease, but merely a symptom, like cough, which may occur in many diseases. The immediate cause of the hemorrhage in the skin is generally either a disorganized condition of the blood or a disease of the blood vessel.

Pur'ree, or In'dian Yel'low, yellow coloring matter brought from India and China in lumps, brown on the outside and deep orange yellow within; made almost exclusively at Monghyr, in Bengal, from the urine of cows fed on mango leaves; used for the preparation of Indian yellow, for artists' purposes, and often adulterated with chrome yellow; consists mainly of the magnesium and calcium salts of euxanthic acid.

Purs'lane (*Portulacaceæ*), a family of succulent dicotyledonous herbs and shrubs, all

COMMON PURSLANE.

harmless and many of them with gay flowers. The purslanes (*Portulaca*), the calandrinias,

and the claytonias, include a few ornamental species. Common purslane (*P. oleracea*) is a well-known weed in the U. S. (where it is colloquially called pusley). It was introduced from S. Europe, where it is freely eaten as a pot herb.

Pur'suivant of Arms, lowest order of officers in heraldry.

Purús (pō'rōs), important tributary of the Amazon, on its S. side; rises in Peru near lat. 11° S., thence passes through Bolivia, flowing NE. through Brazil, and joining the Amazon (after receiving some of its water through several channels, near lon. 61° 30′ W.); is entirely a river of the forest-covered plains; distance in direct line between source and mouth, 900 m.; channel nearly 1,900 m. long.

Pus. See SUPPURATION.

Pusey (pū'zĭ), **Edward Bouverie,** 1800–82; English theologian; b. Pusay, Berkshire; became, 1828, Regius Prof. of Hebrew at Oxford and one of the canons of Christ Church; took strong ground in favor of the confessional; was mainly instrumental in fostering the growth of conventional institutions; wrote several of the "Tracts for the Times," which caused the Tractarian movement to be styled "Puseyism"; defended Newman's celebrated tract, "No. 90." Pusey was suspended from preaching, 1843–46, for supposed heretical utterances in a sermon on the real presence. His works in book form include "On the Royal Supremacy," "On the Real Presence," "Eirenicon."

Push'kin, Alexander Sergeievitch, 1799–1837; Russian poet; b. Moscow; was a clerk in Ministry of Foreign Affairs, 1817–20; discharged for an "Ode to Liberty"; restored, 1825, by the Emperor Nicholas, and charged with writing the history of Peter the Great; killed in a duel in St. Petersburg; works include the romantic epics, "Ruslan and Lyudmilla" and "The Prisoner of the Caucasus"; "Poltava," a metrical romance; "Boris Godunow," a drama; his novels were written under the pen name of Belkin.

Pus'ley. See PURSLANE.

Put'nam, Israel, 1718–90; American military officer; b. Salem, Mass.; removed to Pomfret, Conn., 1739; was a farmer and wool grower; commanded a company with distinction at Crown Point and Ticonderoga during the French War; captured by the Indians and saved only by the intervention of a French officer; held prisoner in Montreal, but exchanged, 1759, and promoted to lieutenant colonel; served in Pontiac's War, 1764. While serving in the Connecticut Legislature, 1775, Putnam was made a brigadier general; fought with great bravery at Bunker Hill; made major general by Congress; commanded at the defeat on Long Island, 1776. On evacuation of New York City, went to Philadelphia to complete its fortifications; in May, 1777, assigned to command the army in the Highlands of New York; removed on account of the loss of forts Montgomery and Clinton, but later acquitted and restored to command; then served in Connecticut.

Putnam, Rufus, 1738–1824; American military officer; b. Sutton, Mass.; served in the French War, 1757–60; appointed deputy surveyor of Florida, 1773; in Revolutionary War superintended defenses of Roxbury, Mass.; appointed chief engineer and charged with defense of New York City by fortifications; constructed the works at West Point in connection with his cousin, Israel Putnam; commanded regiment in Wayne's brigade till close of war. In January, 1783, he was appointed brigadier general; formed a land company, which founded Marietta, Ohio, the first permanent settlement in the Northwest; judge of Supreme Court of the Northwest Territory, 1789; accompanied Gen. Wayne's army to Detroit against the Indians, 1792; later as U. S. commissioner negotiated treaty with numerous tribes; U. S. surveyor general, 1793–1803.

Puts and Calls, terms used in U. S. stock markets, in connection with "privilege"; "puts" meaning sales; "calls," purchases; "privileges" to "put" or "call" are usually sold one day and hold good to the close of the next; system a regular feature of the New York Stock Exchange, but in some states regarded as gambling. Examples: A., believing a certain stock will rise in price, buys of D. for $100 the privilege of calling on latter for 100 shares of the stock within a specified time. In case price rises, he calls for the shares and receives the difference between the price at time of purchase of privilege and that on the day he calls. Should the stock have fallen he loses his $100. Again, if A. believes the stock will fall he puts up $100 and promises to deliver to D. 100 shares at a specified price and time. Should the stock fall below the specified price he calls on D. for the difference; if it rises he loses his $100.

Put'ty, cement for filling cavities in cabinet and carpenters' work, for fastening window panes in sashes, etc. Ordinary putty is made of whiting (fine chalk) and boiled linseed oil, kneaded into a mass and beaten with a mallet. The addition of a little tallow prevents its getting too hard.

Putty Pow'der, oxide of tin, or a mixture of this oxide with oxide of lead, used for polishing glass, etc. It is prepared by calcining tin or a mixture of tin and lead. For the optician's use it is prepared by precipitating a solution of tin in aqua regia with ammonia, washing, drying, and igniting the product.

Puvis de Chavannes (pü-vēs' dė shă-vän'), **Pierre,** 1824–98; French historical painter; b. Lyons; pupil of Henry Scheffer and of Couture; commander of Legion of Honor, 1889; was one of the greatest artists of the French school; his mural paintings in the Panthéon, the New Sorbonne, and the Hôtel de Ville in Paris, the museum at Amiens, and other public buildings in France, and the Boston Public Library, placed him at the head of modern decorative painters.

Puy, Le, or **Le Puy-en-Velay** (lė pwē'-ŏn-vė-lā'), capital of Haute-Loire, France; 70 m.

SW. of Lyons; near the Loire, on slopes of Mt. Anis, on the summit of which is a basaltic mass called Mt. Corneille, crowned by a figure (53 ft. high) of the Virgin, made of Russian cannon brought from Sebastopol. Pop. (1901) 20,507.

Puzzola'na. See POZZUOLANA.

Pyæ'mia. See BLOOD POISONING.

Pyat (pē-ä'), **Felix,** 1810–89; French dramatist and politician; b. Vierzon; was an extreme radical agitator from the Revolution of 1848 to the Communist uprising of 1871; his part in latter caused him to flee from France; sentenced to death by Council of War, 1873; in exile continued writing inflammatory political documents; most noted works, "A Revolution of Other Times, or the Romans at Home," "The Brigand and the Philosopher," "Arabella," drama; "Cedric, the Norwegian," "The Rag-Picker of Paris," a tragedy; "Diogenes," "Tiberius," etc.

Pyd'na (now KITRO), ancient town of S. Macedonia, near the W. shore of the Thermaic gulf. Here Æmilius Paulus vanquished Perseus, the last king of Macedon (168 B.C.). Under the Romans it was also called Citrum or Citrus, whence its modern name.

Pygmalion (pĭg-mā'lĭ-ŏn), in Greek legend, king of Cyprus, who fell in love with an ivory statue of a maiden which he himself had made. He prayed to Aphrodite to endue the statue with life; his prayer was granted, and the animated statue became his wife and bore to him Paphus.

Pyg'my, or Dwarf, Tribes, peoples much under average stature; found in small numbers in S. India and Madagascar, constituting a large part of the inhabitants of the Andamans, and spread widely over the S. half of Africa. Their origin is unknown, but all seem to pertain to the negro or negrito family. Their existence has been known since the dawn of history, but they were not rediscovered till the second half of the nineteenth century. The pygmy tribes of Africa have been distributed into four great groups. The first group (Obongo, Akoa, Babongo) live chiefly among the forests between the Gabun, Ogowe, and Kongo rivers. The height of the adult male Obongo is 4.3 to 4.7 ft., while that of the women is less. The second group (Akka, Wambutti, Batua) are the most important tribes of pygmies. They inhabit the vast forest region S. of the upper part of the Mobangi-Makua tributary of the Kongo, and are found also far S. along the Lomani, Chuapa, Bussera, and other tributaries of that river. They range in height from 4.3 to 4.8 ft., the Akkas being the smallest known people. The third group are the Dokos and other tribes living E. of the Nile and S. of Kaffa and the Omo River. They are similar in size, appearance, and habits to the pygmies of the upper Nile and Kongo regions. The Bushmen and their relatives, comprising the fourth group, are from 4 to 4.5 ft. in height, and subsist by the chase and on the roots and fruits of the Kalahari Desert.

Pygop'odes, name of an order of birds containing the loons (*Urinatoridæ*), the grebes (*Podicipidæ*, or *Colymbidæ*), and the auks (*Alcidæ*), all having the legs far back and only to a small extent free from the body. These birds are all expert divers.

Pylades (pĭl'ă-dēz), in Greek mythology, son of Strophius, King of Phocis, and Anaxibia, the sister of Agamemnon, after whose murder by Clytemnestra, their son Orestes, being carried secretly to the court of Strophius, formed the friendship with Pylades which has become proverbial. He assisted Orestes in murdering Clytemnestra, and eventually married his sister Electra.

Py'lon, in Egyptian architecture, name given to a tower or mass of masonry, somewhat resembling a truncated pyramid, placed one on each side at the entrance of temples, and having a very imposing appearance. Behind the pylons in large temples was often an open court, and in front an avenue with sphinxes on either side. An entrance of which these pylons form part is sometimes called a propylon.

PYLON.

Py'lus, town of Messenia, on the promontory of Coryphasium; one of the last towns taken by the Spartans in the second Messenian War. In 424 B.C. the Athenians built a fort on the site of the town, which became very famous in the Peloponnesian War. The present name, NAVARINO, is a corruption of *Avarino*, the Avars having settled here in the sixth century. Pop. abt. 2,000.

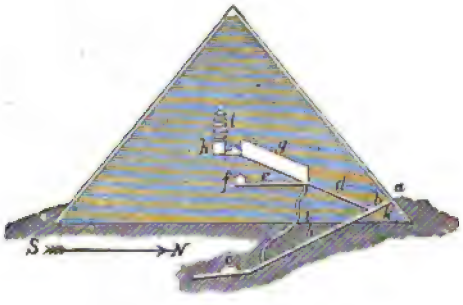
Pym (pĭm), **John,** 1584–1643; English statesman; b. Brymore, Somerset; elected to Parliament of 1621, in which he became a leader of the opposition to the royal encroachments on parliamentary rights; active in impeachment of the Duke of Buckingham, 1626; recognized leader of the "Short Parliament" of 1640 and of the "Long Parliament" of 1641; managed impeachment of Strafford and trial of Laud; presented the "Grand Remonstrance," which set forth the evils from the beginning of the reign of Charles I; chief of the "five members" whose attempted seizure by the king, 1642, made reconciliation with Parliament impossible; real head of the provisional executive established at London after the king's flight; buried in Westminster Abbey.

Pynchon (pĭn'chŭn), **William,** abt. 1590–1662; American colonist; b. Springfield, England; one of the patentees of the Massachusetts Bay Company; emigrated, 1630; chief founder, 1636, of Agawam, Mass., renamed Springfield; published a book opposing the Calvinistic view of the atonement, entitled "The Meritorious Price of Man's Redemption"; for this was so ill treated that he returned to England, 1652. His son John (1621–1703) was an assistant under the first Massachusetts royal charter, and, 1686–1703, was several times councilor.

Pyr'amid, polyhedron having any polygon for a base, the remaining faces being triangles

meeting at a common point called the *vertex*. The triangular faces taken together make up the *lateral surface* of the pyramid. A spherical pyramid is a portion of a sphere bounded by any spherical polygon, called the *base*, and by corresponding sectors of great circles. The vertex is at the center of the sphere.

PYRAMIDS were built in the form of a geometrical pyramid by several ancient nations. Of these the Egyptian are the most important. These are usually square at the base, and were erected as tombs of the Pharaohs down to the twelfth dynasty at least, their number being formerly much larger than now. Natural decay, fanatical zeal, and building activity in Cairo have reduced their number and mass. Like the Mastaba, their purpose was that of a permanent tomb for the mummy of the royal builder. They are constructed of red or syenitic granite from the quarries of Assouan



SECTION OF THE GREAT PYRAMID.

(Syene), and of a hard calcareous stone from the quarries of Mokattam and Turah. The blocks are of extraordinary dimensions, and their transportation and placing indicate a surprising degree of mechanical skill.

The number of those in the region near Memphis, now existing in greater or less degree of dilapidation, amounts to seventy-five, and they are arranged in several groups. The area which they cover is about 25 m. long, extending S. on the W. side of the Nile from Abu Roash, opposite Cairo, to Dahshûr. They were built on the same general plan, and, like the mastaba, had certain essential features: the chamber for the reception of the mummy, or several chambers when more than the mummy of the king was to be deposited inside; the passageways more or less complicated, and the chamber of offerings, which was an integral part of the plan, though actually located outside of the pyramid itself. The entrance was almost invariably on the N. side, and opened into a descending passageway ending in a subterranean chamber. Another gallery midway of the first branched off upward and led to the sepulchral chamber near the center of the mass. In the Great Pyramid at Gizeh there were two sepulchral chambers—one below, presumably for the queen, and a second for the king on a higher level.

A rocky site was chosen and leveled to form a foundation, a portion of the rock being left in the center for a core. After the subterranean passages and chamber had been excavated the building was begun about the core and was completed so far as to make a finished whole, though perhaps of small size. It contained all the essential features, and only lacked its later gigantic size. During succeeding years more layers of stone were added, and the longer the reign of the building Pharaoh the larger his tomb.

The largest of the pyramids of Gizeh is the oldest, having been constructed by Khufu, or Cheops, the second king of the fourth dynasty. It is 755 ft. square and 451 ft. high, and was originally about 775 ft. square at the base and 481 ft. high. At the top is a flat space 30 ft. square. It contains 85,000,000 cubic ft. of stone. It still contains the broken red granite sarcophagus of Cheops. According to Herodotus, Cheops employed 100,000 men for twenty years in building this pyramid. The next largest pyramid was that of Khafra, or Chefren, the successor of Cheops, though it does not contain his name. It measures 700 ft. square at the base and is about 450 ft. high. The sepulchral chamber is 46½ by 16⅓ by 22½ ft. It was opened and explored by Belzoni, 1816. The third pyramid of Gizeh belonged to Menkara, or Mycerinus, the fourth king of the same dynasty.

Pyr'amus and This'be, youth and maiden of Babylon, celebrated in Ovid's "Metamorphoses." Their parents opposed their union, but the lovers made an agreement to meet at the tomb of Ninus. There Thisbe arrived first, but, terrified by a lioness which had just torn an ox to pieces, she hid herself in a cave, and in her flight lost a mantle, which was rent by the lioness. When Pyramus came and found the garment torn and bloody, he fell upon his sword; and when Thisbe found the body of her lover, she slew herself with the same weapon.

Pyr'enees, lofty mountain system, forming boundary between France and Spain; stretches from the Mediterranean to the Bay of Biscay; length, 240 m.; average breadth, about 75 m.; broadest and highest about midway, where the two almost parallel ranges of which the mountains consist are connected by a number of wild, towering peaks, of which the highest is Pic de Nethou, 11,168 ft. There are seven passes at an elevation of over 7,000 ft.

Pyr'idine, oily base found in bone oil, shale oil, peat tar, coal naphtha, and the products of the destructive distillation of cinchonine; occurs in tobacco smoke. It is produced artificially by the dehydration of amyl nitrite, by heating piperidine with nitrobenzine, and together with other similar substances by heating glycerin with ammonium sulphate and sulphuric acid; in medicine, used in treatment of asthma.

Pyri'tes, in its widest sense, a native mineral, massive or crystalline, composed of a metallic sulphide or arsenide, or both. Iron, copper, nickel, and cobalt pyrites are the ores generally mentioned. Iron pyrites is often found crystallized in cubes or in other forms. From its bright yellow color it is sometimes mistaken for gold, and is popularly called "Fool's Gold." It is used in making sulphuric acid

and the sulphates and other commercial sulphur compounds; also yields not infrequently much silver, copper, or gold. Copper pyrites is an impure double sulphide of iron and copper, extensively employed not only as a source of sulphuric acid, but also of metallic copper.

Pyrogal'lol, or Pyrogal'lic Ac'id, substance discovered by Scheele by subliming gallic acid of gallnuts; forms a beautiful mass of snow-white crystals, extremely light and feathery; used as an agent in analysis of gaseous mixtures containing oxygen, and as a developer in photography.

Pyrog'raphy, art or process of making designs on wooden panels, or larger surfaces, or on leather, by means of a metallic point or small tube heated red hot by sulphuric ether. Sometimes a heated die is impressed into the surface to be decorated. Panels of much artistic merit are produced in some parts of Europe by simpler means, such as pointed implement, heated in an ordinary flame. Friezes, etc., of elaborate design and great beauty are executed by various artists in the U. S.

Pyrom'eter, instrument for measurement of high temperatures; particularly apparatus for determining the temperature of furnaces and flues. Pyrometers may be classified in general as expansion and electrical pyrometers. The only substances available for expansion pyrometers are (1) highly refractory solids and (2) gases inclosed in a refractory and gas-tight bulb or reservoir. The best-known instruments of the first class are the pyrometers designed by Josiah Wedgwood, 1782, for the measurement of kiln temperatures in his celebrated potteries, and by Daniell. Various gas thermometers have been used for high-temperature measurements, and it is by means of this class of instruments that the most satisfactory absolute determinations have been made. Hydrogen, air, mercury, and iodine are among the gases and vapors thus employed; copper, iron, platinum, and porcelain among the materials for bulbs and reservoirs. The laborious character of operations with the air thermometer has led investigators to adopt the more manageable methods of pyrometry based on thermoelectricity and the influence of temperature on electrical resistance. The only metals available for either of these methods are platinum and the rare metals belonging to the same family. Thermoelectric couples consisting of platinum and one of the alloys of platinum with one of the kindred metals, such as iridium or rhodium, afford a means of measuring high temperatures which is probably less open to objection than any other as yet devised.

Pyr'ope, fine dark-red garnet, much used in jewelry, and incorrectly called hyacinth, ruby, and carbuncle; comes from Ceylon, Germany, Scotland, etc.

Pyroph'ori, term applied to substances which kindle spontaneously and enter into combustion when exposed to the air, the term being confined, however, to solid substances, and not applied to spontaneously inflammable liquids. Carbon, phosphorus, and many easily oxidable metals may be made pyrophoric by preparation in a state of extreme division. Iron may be obtained in pyrophoric form by many methods, even by simple reduction of the oxide with hydrogen gas at a minimum temperature. A lead pyrophorus is obtained by charring dry tartrate of lead in a close tube. If, after cooling, the tube be crushed, a beautiful shower of fire, metallic lead and carbon in combustion, makes its appearance. Some common lignites, very finely pulverized and thoroughly dried by heat, are pyrophoric when warm.

Pyrophos'phates. See PHOSPHORIC ACID.

Pyrotech'ny, art of making fireworks for amusement or signals. Fireworks are said to have originated in the East. There were fire-work displays in China centuries before their introduction into Europe, and the Chinese and Japanese still excel in some branches of the art. The compositions prepared for fireworks are numerous. Gunpowder and its ingredients, niter, sulphur, and charcoal, are the chief constituents. Clean steel filings are used to produce what is known as the Chinese "brilliant fire." Copper filings and the salts of copper give a greenish tint to the fire; zinc filings, a fine blue; sulphuret of antimony, a light greenish blue with much smoke; amber, rosin, and common salt protected against dampness, are used to give a yellow fire; a red is produced by lampblack, and a pink by niter in excess; the salts of strontia also give a red color, and those of barytes a green. The most useful piece of fireworks is the sky rocket, employed as a signal, and under favorable circumstances visible for many miles. It is made of various compositions, which are packed in tubes formed by rolling paper hard round a cylindrical core. The match by which the rocket is to be fired is introduced into the cavity at the bottom, and the whole surface of the composition forming the walls of the cavity is instantly ignited. The gaseous products, being violently ejected from the open end, react with equal force, carrying the rocket forward in the other direction. Roman candles are cylindrical cases charged with stars, alternating with a composition like that of the rockets, and with gunpowder. The effect is heightened by varying the composition and colors of the stars. A red fire may be made by mixing 4 parts of dry nitrate of strontia with 15 of pulverized gunpowder; or this may be varied with 40 parts of the strontia, 13 of sulphur, 5 of chlorate of potash, and 4 of sulphuret of antimony. A green fire like that burned in theaters, which gives to everything on the stage a deathlike aspect, is produced by 77 parts of nitrate of barytes, 13 of sulphur, 5 of chlorate of potash, 3 of pulverized charcoal, and 2 of arsenic.

Pyr'rha. See DEUCALION.

Pyrrhic (pĭr'ĭk) **Dance,** Grecian war dance in full armor. It originated in Dorian Crete, where its prototype was the dance instituted by the Curetes to drown the cries of the infant Zeus. It was a mimic fight, intended to illustrate the art of attack and defense. It became popular in imperial Rome.

Pyrrho (pĭr'ō), abt. 360–270 B.C.; Greek philosopher; b. Elis; was a painter, poet, and companion of Anaxarchus, under whose patronage he joined the Eastern expedition of Alexander the Great. After the Indian campaign he returned to Elis, where he was made high priest. He held that virtuous imperturbability is the highest aim of life, and that truth, from a scientific point of view, is unattainable. He developed his views only orally, and his followers, the skeptics, were known as Pyrrhonists.

Pyrrhus (pĭr'ŭs), 318–272 B.C.; Greek monarch and military officer; b. Epirus; son of King Æacides; was placed on the throne, 307, by Glaucias, King of the Taulentanians, but was banished, 302; fought bravely at Ipsus; went to Egypt, and, aided by Ptolemy, regained the throne, 295; conquered Macedonia, 287, but soon lost it to Lysimachus; espoused the cause of the Tarentines against Rome, 281, and won in several battles. Carthage having combined with Rome against him, Pyrrhus left Italy and applied himself to the conquest of Sicily, but being deserted by the Sicilians, who joined their late enemies, returned to Italy, 276, after the Carthaginians had defeated his fleet, and was defeated by M. Cuirus Dentatus at Beneventum, 275. He returned to Epirus, 274, invaded and annexed a large part of Macedonia; undertook the conquest of the Peloponnesus, 272; was killed in a fight with the forces of Antigonus of Macedonia, at Argos.

Pyrrhus (so named from his red hair; later called NEOPTOLEMUS), son of Achilles and Deidamia; was one of the warriors concealed in the wooden horse at the siege of Troy; slew Priam; sacrificed Polyxena on the tomb of Achilles, and married Andromache.

Py'rus, genus of rosaceous trees and shrubs of some fifty species, among which are the apple, pear, and quince.

Pythag'oras, b. abt. 582 B.C.; Greek philosopher, supposed to have been a native of Samos; to have had as one teacher Anaximander; in early life to have traveled through Ionia, Phœnicia, and Egypt, where he was initiated into the mysteries by the priests. He went to Crotona, Italy, 529 B.C., and there established a society with ethical, political, and philosophic tendencies. His school was allied with the aristocratic party, and consequently incurred the animosity of the democratic party. This occasioned (abt. 510) his retirement to Metapontum, where he died soon after. The doctrines of metempsychosis, of the cyclic return of events, of contraries, taught by him—according to which he added to the principle of his master, Anaximander (which was "the unlimited"), its opposite, the limiting—indicate Persian or Egyptian influence. Pythagoras is said to have anticipated the Copernician doctrine, making the sun the center of the cosmos; also to have discovered the numerical ratio existing between musical tones of the gamut (either by length of strings or by their degrees of tension). He sought to establish a new ethical basis for society in place of the unconscious use and wont that had prevailed up to his epoch, and laid the greatest stress on the discipline of the will into obedience, temperance, silence, self-examination, simplicity in personal attire, and self-restraint in all its forms.

Pyth'eas, Greek navigator of Massilia (Marseilles); flourished about the age of Alexander the Great; said to have made two voyages, in one of which he visited Britain and Thule (perhaps Iceland), and in the second passed along the W. and N. coasts of Europe. He wrote two books, one of which was probably an account of his first voyage, and the other, entitled "Periplus," of his second. Polybius and Strabo treat the statements of Pytheas with contempt; but in modern times it has become evident that he was a bold navigator and sagacious observer. A few fragments of his works are extant.

Pyth'ia. See DELPHI.

Pyth'ian Games, festivals held late in August of the third year of each Olympiad at Delphi, Phocis, in honor of Apollo, who established them in commemoration of his victory over the Python. Originally the contests were purely musical. After the sacred war (355–346 B.C.) the festivals were conducted under the direction of the Amphictyonic Council. A day devoted to athletic sports was added, and by degees various forms of horse races and chariot races were introduced.

Pyth'ias. See DAMON AND PYTHIAS.

Py'thon. See BOA.

Pyx (pĭks), strong box used in the mints of Great Britain and the U. S. for the safe keeping of coins set apart from each successive coinage to be examined by a commission of experts for the purpose of testing their accuracy as to weight and fineness. The examination of these reserved coins is called the "trial of the pyx." In Great Britain this trial takes place "at least once in every year in which coins have been issued from the mint" before a sworn jury of at least six goldsmiths. In the U. S. it is provided that a trial of the pyx shall be made at the mint in Philadelphia on the second Wednesday in February, annually. This takes place before the judge of the district court of the U. S. for the E. district of Pennsylvania, the comptroller of the currency, the assayer of the New York assay office, and other persons designated by the President. A majority of the commissioners constitute a competent board. Their examination is to be made in the presence of the director of the mint.

Pyx, sacred vessel, having usually the form of a covered cup with a foot, used in the Roman Catholic Church to contain the sacred wafer when preserved after consecration.

Pyx'is, or Pyxis Nau'tica ("ship's compass"), one of fourteen constellations added to previous ones by Lacaille in connection with his work at the Cape of Good Hope, 1750–54; is surrounded by Vela, Puppis, Hydra, and Antlia; brightest star is of the 3.8 magnitude.

Q

Q, seventeenth letter and thirteenth consonant of the English alphabet; corresponds to the Hebrew and Phœnician *koph*, and as it is seldom used except in conjunction with *u*, most grammarians are disposed to regard it as a superfluous letter whose place could be supplied by *k*. It does not occur in the Greek, old Latin, Slavic, Irish, or Saxon alphabet. It was introduced into the Latin at an early period, but was rejected by Varro and some other grammarians. See ABBREVIATIONS.

Qua'di, powerful ancient people of SE. Germany, of the Suevic race; inhabited the country between Mount Gabreta, the Hercynian forest, the Sarmatian Mountains, and the Danube (portions of Bohemia, Moravia, and Lower Austria). In the reign of Tiberius the Romans erected a kingdom of the Quadi, but during the reign of Marcus Aurelius they joined the German confederacy against the empire. They remained independent till their disappearance from history about the close of the fourth century.

Quad'rant, fourth part of the circle, or an arc of 90°, and hence an instrument employed for measuring angles in any plane. The use of quadrants has been for surveying and for making astronomical observations, and especially in navigation for determining the meridian altitude of the sun, and through this the latitude of the observer. They have been constructed of a great variety of forms and dimensions adapted for their several uses; but at present the interest attached to them is historical only, as they have been entirely superseded either by the sextant or the full circle. In gunnery, the quadrant or gunner's square is a rectangular frame with a graduated arc between the two limbs.

Quadrat'ic Equa'tion. See EQUATION.

Quad'rature, operation of finding an expression for the area bounded by a line or lines, straight or curved, on a plane.

Quadrature of the Cir'cle, geometrical problem of finding a square whose area shall be rigorously equal to that of a given circle. It is one of four celebrated problems vainly attacked by the ancients, the other three being: (1) the duplication of the cube, or the construction of a line the cube of which shall be double that of a given line; (2) the trisection of an angle; and (3) the insertion of two geometric means between two given lines. All of these problems are shown by modern mathematics to be unsolvable in the ancient sense. As the area of a circle is equal to that of a right-angled triangle, the altitude of which is the radius of the circle and the base of its circumference, and as the side of a square of equal area is a mean between the height and half the base of the triangle, the problem would be solved if the circumference bore a perfectly measurable proportion to the radius. Archimedes undertook the solution by calculating the peripheries of two polygons of many sides, one circumscribed and the other inscribed about the circle. This gives the ratio of diameter to circumference between 1:3$\frac{10}{71}$ and 1:3$\frac{1}{7}$. The Hindus early arrived at the proportion 1,250:3,927, or 3.1416, which is more exact. In modern times the first great step in improving the calculation was made by Peter Metius, a Hollander. By calculating from polygons of about 1,536 sides he found that the proportion was less than 3$\frac{17}{120}$ and greater than 3$\frac{16}{113}$; and presuming that the mean of these was nearer the truth than either limit, he hit thus by chance on a near approximation, and determined a ratio convenient for practical purposes, *viz.*, 113:355. The error involved in this expression in a circle of 1,900 m. circumference is less than 1 ft. Ludolph van Keulen, another Hollander, about the same time, 1590, extended the calculation to thirty-six figures, which are engraved on his tombstone in Leyden. These are 3·14159265358979323846264338327950289. The last figure is too large, and 8 would be too small. In 1853 a Mr. Shanks reached the number of 607 decimals. When it was made evident that the arithmetical expression was impossible, a geometrical construction was attempted; but this, too, is now generally admitted to be impracticable.

Quadrilat'eral, The, name commonly applied to the Italian strongholds of Peschiera, Mantua, Verona, and Legnago, or to the trapezoidal-shaped territory the angles of which are indicated by these four towns. From Peschiera to Verona is 15 m., and from Mantua to Legnago 21 m. This quadrilateral has formed the base of all military operations against Italy during almost a thousand years. Its possession has been supposed to assure control of the peninsula. In like manner Rustchuk, Silistria, Shumla, and Varna form the quadrilateral of the Balkan Peninsula, and were considered the main defense of Constantinople, and of the Ottoman possessions in Europe until the Russian-Turkish War of 1877. The third or Asiatic quadrilateral was formed by Batum, Ardahan, Kars, and Baiezid at the NE. of the Ottoman possessions in Asia. The Treaty of Berlin left only Baiezid to the Ottomans. The four were a defensive line of fortresses rather than a real quadrilateral, though so called.

Quadrille', a dance of French origin, usually danced by four couples, each couple forming one side of a square and dancing either with the opposite couple or across the corners of the square with the couple to the right or left. Sometimes danced with eight couples, called a "double header." The dance consists of five figures, all except the first being repeated. Previous to each figure eight bars of music are played.

Also the name of a game of cards, now obsolete.

Quadru'mana, name employed by Blumenbach, 1791, as an ordinal designation for the monkeys, lemurs, and related types, man having been isolated as the representative of a peculiar order named *Bimana.* The two types are now generally combined in one order named *Primates,* under which head man and the monkeys are combined in one suborder (*Anthropoidea*), and contrasted with the lemurs, which constitute another suborder (*Prosimiæ*).

Quad'ruple Alli'ance, (1) alliance against Spain, concluded, 1718–19, between Great Britain, France, Austria, and Holland; (2) alliance between Spain, Great Britain, France, and Portugal, 1834, for the defense of constitutionalism against the Carlists in the first-named country.

Quæs'tor, magistrate of ancient Rome, appointed originally to assist the consuls in the detection of crime and the administration of justice, and later serving as their assistants. Their number increased from four in 421 B.C. to twenty in the time of Sulla, and was raised to forty by Julius Cæsar, but reduced again to twenty by Augustus. At Rome the quæstors were charged with criminal jurisdiction (jurisdiction in civil suits falling to the prætor), with the management of the public finances and of the state archives. In the provinces the chief duties of the quæstor consisted in the management of financial affairs for his superior officer. Election to the quæstorship carried with it admission to the senate.

Quag'ga. See ZEBRA.

Quail (kwāl), popular name for various small gallinaceous birds, but strictly speaking belonging to the common quail (*Coturnix communis*) of Europe, Asia, and N. Africa, a

COMMON QUAIL.

member of the subfamily *Perdicinæ,* and a near relative of the Partridge. The European quail is 7 in. long, brownish or reddish gray above, marked with streaks of buff; below, general pale bluff, fading into white on the belly. Other members of the genus occur in Asia, Australia, and New Zealand. In the U. S. the name is commonly bestowed on the bobwhite (*Colinus virginianus*), the "partridge" of the S. states, but is often extended to other species. The New World birds belong in the subfamily *Odontophorinæ.* See BOBWHITE.

Quain, Richard, 1800–87; British anatomist and surgeon; b. Fermoy, Ireland; became demonstrator, 1828, and Prof. of Anatomy in Univ. of London, 1832; surgeon to the N. London Hospital, 1850–66; held several places in the Royal College of Surgeons, and was surgeon extraordinary to the queen. His elaborate treatise on the "Anatomy of the Arteries of the Human Body" ranks as a classical work. He edited, with others, the fifth edition of "Quain's Anatomy," originally written by his brother, Jones Quain (1796–1865).

Quak'ers. See FRIENDS, SOCIETY OF.

Quak'ing Grass, any grass of the genus *Briza.* The spikelets are ovate, and have such delicate stalks that a light wind sets them quaking and rattling. *B. maxima* and *B. media,* from Europe, are cultivated in gardens, and the latter is partly naturalized in the U. S.

Quan'tity (in meter), the time consumed in uttering syllables, or the duration of syllables. It is, of course, relative. The duration of a short syllable in slow utterance may be as great as that of a long syllable in rapid utterance. Quantity and quality (nature, timbre) are often confounded. When the first *o* in "coöperate" is called "long" and the second one "short," these terms should be understood only of the quality. The confusion is increased, or rather the error is emphasized, by the use of quantity marks (—, ⏑) to indicate these sounds. Difference of quantity is, no doubt, often associated with difference of quality, but the latter does not constitute the former.

While the ancient languages had great variety of quantity, that of each particular syllable was more fixed than with us. This may be seen by applying English analogy to ancient words. All pronounce "amicus," "amavi" with the second syllables long; but in "amicitia," "amavisti" many make those same syllables short, whereas they were just as long as in the former words. To the Roman ear āmābāmŭs would have been as barbarous as "āmābam." It has often been denied that there is any consciousness of quantity in English. It is true that we do not feel any definite relation of long syllables to short ones in reading or speaking as we do in singing (and, indeed, this was the case with the ancients); but that there is sometimes difference of quantity can be perceived by comparing "furrow" with "furlough," "bonnie" with "spondee," "tory" with "turnkey," etc. In reading verse, however, we merely make the feet approximately equal without feeling or perceiving exactly how it is accomplished, just as in singing we can give the voice a definite pitch without any consciousness of the vibrations that determine the pitch.

Quan'za. See CUANZA.

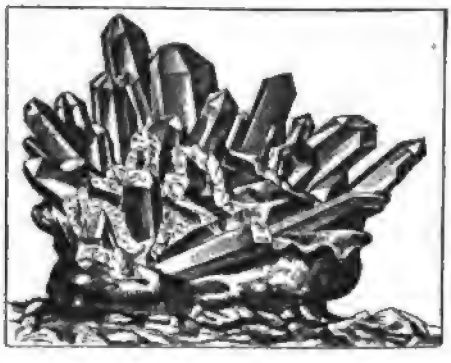
Quar'antine (literally "space of forty days"), time during which vessels and their passengers, cargo, etc., are isolated on entering a port when they are suspected of carrying contagion; term also denoting such detention, and all the means employed therein. Moses prescribed (Lev. xiii) stringent precautionary measures to prevent the spread of disease. When the crusaders occupied Jerusalem, they established outside of the city an isolated place for the treatment of contagious diseases, called the hospital of St. Lazarus, whence the word *lazaretto*. Quarantine in Europe dates from the thirteenth or fourteenth century, when leprosy prevailed in Italy and France. The first quarantine regulation originated with Viscount Bernabo of Reggio in Italy, January 17, 1374. The Venetian Senate, 1448, enacted a digest of laws known as the laws of quarantine. In the latter part of the eighteenth century efforts were made by John Howard and others to improve the lazarettoes and hospitals, and early in the nineteenth century a call was made for an international congress to consider quarantine measures. By this time the plague had waned in power and had invaded Europe as an epidemic for almost the last time.

The present U. S. quarantine laws and regulations, the latter promulgated 1894, are designed to obviate the detention of incoming vessels and passengers in so far as this is compatible with the practically absolute exclusion of infectious diseases. As a means both to prevent delay and to exclude contagion, quarantines have been established by the U. S. Govt. at all foreign ports of departure, and every vessel leaving such a port must have a bill of health from the proper U. S. officer, consular or medical, "setting forth the sanitary condition and history of the vessel, and that it has in all respects complied with the rules and regulations." The President has power "to prohibit the introduction of persons and property from such countries or places as he shall designate, and for such periods of time as he shall deem necessary." Should there be any evidence that there is infectious matter on board an incoming vessel, it is ordered to proceed to the nearest quarantine station, there to undergo treatment.

Inland quarantine has practically the same object as that of maritime quarantine, *viz.*, the prevention of the transference of infectious disease from one locality to another, and the defining of certain portals through which all persons and things capable of conveying infection may be compelled to pass and undergo the necessary inspection, detention, etc. Domestic quarantine against such diseases as diphtheria, scarlet fever, etc., provide not only for the isolation of the patient, but for the thorough disinfection of infected rooms, bedding, etc.

Quar'termaster Gen'eral, military officer who has, in the U. S. army, the rank of brigadier general; in the British army that of major general or colonel. He is at the head of the department charged with the duty of transporting troops and materials of war, of clothing, feeding, and sheltering troops, of constructing and repairing roads, military telegraphs, railways and bridges, docks and wharves, and generally with all disbursements attending military operations not expressly assigned by law or regulation to other staff departments. There is for each regiment of the line a regimental quartermaster, selected from among the lieutenants of the regiment, who is assisted in his duties by a quartermaster sergeant.

Quartz, abundant and important mineral, including a variety of precious and semiprecious stones, all of them essentially silica (oxide of silicon) more or less pure. Amethyst is a transparent purple variety, owing its color to oxide of manganese. Superb deep-purple gems that change to red by artificial light are found near Mursinka, in the Ural Mountains. Oriental amethyst is a purple variety of corundum or sapphire, and is a far more valuable gem than the ordinary amethyst. Cairngorm



QUARTZ CRYSTALS.

stone, citrine, false topaz, Saxon topaz, Scotch topaz, and Spanish topaz are transparent quartz colored by oxide of iron or by carbonaceous matter. The yellow and brown are produced by heating smoky quartz. Much that is called topaz is this yellow quartz. Prase is a deep-green quartz, sometimes crystallized. It is somewhat rare, but is not much valued or used.

Rock crystal is the purest quartz. It is transparent and colorless. It is widely distributed, but it is brought chiefly from Brazil, Madagascar, and N. Carolina. It is wrought, especially by the Japanese and Chinese, into the polished "crystal balls" and other ornaments. What are known as "Rhine stones," "Lake George diamonds," etc., are not quartz; only paste or lead glass. Rose quartz is a pink or rose-tinted variety, rarely found crystallized. It fades by long exposure to light; is found in Maine, Moravia, and elsewhere. Smoky quartz and smoky topaz are brown to almost black, and probably are colored by carbonaceous matter. The finest crystals of smoky quartz from Mt. St. Gothard, in Switzerland, are now in the museum at Bern. It is also found at Pike's Peak, Col. The black quartz is called morion. By heating, smoky quartz yields paler shades and yellows, which

then are called cairngorm stone, Spanish topaz, etc.

The varieties containing foreign inclusions are *aventurine*, called also *gold stone*, a brown quartz containing spangles of mica or göthite, found at Aventura, Spain, and in Asiatic Russia. The artificial gold stone, a brown glass filled with minute crystals of copper, is made in Venice and used for inlaid work, etc. Cat's-eye quartz (see CAT'S-EYE), Thetis's hair-stone, Venus's hair-stone, Sagenite, and Flèches d'Amour are quartz penetrated by needlelike crystals of hornblende, rutile, göthite, and similar minerals.

Quassia (kwŏsh'ĭ-ă), bitter drug, consisting originally of the wood of a tree of the family *Simarubeæ*, found in Surinam, first made known by a negro slave named Quassi. Toward the end of the eighteenth century it

BITTERWOOD.

was discovered that a tree known in Jamaica and neighboring islands as bitterwood and bitter ash had properties nearly identical with quassia. The drug from this has almost entirely supplanted the Surinam drug, and, though afforded by a different tree, it is called quassia. This tree is *Picræna excelsa*, an allied genus, in the same family with the other. The properties of quassia are those of the simple bitters, and it is adapted to cases of dyspepsia and the debilitated state of the digestive organs which sometimes succeeds acute disease.

Quater'nary E'ra, division of geologic time coördinate with Primary, Secondary, and Tertiary. The term Primary has almost ceased to be used, and though Secondary and Tertiary are still employed, there is a growing tendency to substitute as general classific terms Paleozoic, Mesozoic, and Cenozoic, the term Cenozoic being made to include the divisions once called Tertiary and Quaternary. The same tendency replaces Quaternary Era by Pleistocene Period.

Quater'nions, mathematical method invented by Sir William Rowan Hamilton abt. 1840. Its fundamental idea is that of a vector. This latter is defined as a line passing from one (initial) point in space to another (terminal) point. It has two elements—*length* and *direction*. Two vectors are considered equal only when these two elements are the same in each. A vector moved about in space will remain the same vector so long as it remains parallel to itself and unchanged in length; but if either length or direction is changed, it becomes a different vector. The sum of two vectors is the vector joining the initial point of the first to the terminal point of the second when the two are placed end to end without changing the direction of either. Any number of vectors may be added on this principle. A quaternion is defined as an operator, of which the function is to change one vector into another by altering its direction and its length. The operation which changes the length of the vector is in this case called the *tensor* of the quaternion, and that which changes the direction is called the *versor*. One quantity, a number, determines the tensor, and three are required to determine the versor, making four in all. Hence the term *quaternion*.

Quatre Bras (kătr brä'). See WATERLOO, BATTLE OF.

Quebec (kwė-bĕk'), formerly LOWER CANADA, province of Dominion of Canada, N. and S. of the St. Lawrence; bounded N. by Ungava, E. by Labrador and Gulf of St. Lawrence, S. by Bay of Chaleurs, New Brunswick, Maine, New Hampshire, New York, and Ontario; W. by Ontario; area, 351,873 sq. m.; pop. 2,002,712; principal towns, Montreal, Quebec (capital), Hull, Three Rivers, St. Hyacinthe, Sorel, Valleyfield, St. Johns, Frazierville, or Rivière du Loup. Climate on the whole agreeable and bracing; thermometer in summer seldom registers beyond 90° F., and in winter sometimes falls 20° below zero; snow begins to fall in November, and, in the districts N. of the St. Lawrence, covers the ground till March or April; in the E. townships snow does not fall so early nor lie so late.

Chief mountain ranges, the Laurentian or Laurentides, N. of the St. Lawrence, a range of highlands whose highest elevation, the Eboulements, is 2,547 ft.; highlands of Val Cartier, Laval, Murray Bay, and the Saguenay region noted for their rugged grandeur; Notre Dame range, in Peninsula of Gaspé, an extension of the Alleghanies from the New England states through New Brunswick; tract between these great ridges and the shores of the St. Lawrence for the most part undulating and fertile. Chief waterways, the St. Lawrence and its numerous tributaries, the most important being the Ottawa, St. Maurice, and Saguenay on the N., the Richelieu, St. Francis, and Chaudière on the S. Montmorency River falls abruptly into the St. Lawrence over a ledge 250 ft. high. Most important lakes, St. John, drained by the Saguenay, area 360 sq. m.; Temiscaming, drained by the Ottawa, area 126 sq. m.; Champlain, partly belonging to Canada, partly to the U. S., and by a system of canals connecting the trade of the St. Lawrence with that of the Hudson; St. Peter, an expansion of the St. Lawrence above Three Rivers; Memphremagog, the greater part of which lies in

the province; Metapedia; Massawippi, near Stanstead; and Megantic, the source of the Chaudière.

Principal islands: Montreal, Anticosti, Bonaventure, a fishing station near Gaspé; the Magdalen Islands, a group in the gulf, N. of Prince Edward Island. Principal canals, forming a system the largest and most important in the world, are the Beauharnais (11¼ m., with six locks), the Soulanges (14 m., with five locks), the Lachine (8½ m., with five locks), the Carillon and Grenville, and the Chambly.

Mineral products include gold, copper, iron, plumbago, mica, granite, limestone, slate, marble, asbestos, graphite, apatite. Principal agricultural products, hay, oats, potatoes, wheat, turnips, peas, buckwheat, maize, tobacco, and apples; chief domestic animals, sheep, swine, horses, and cattle; most fertile districts found in the E. townships, where creameries and cheese factories yield great profit. Manufacturing industries are noted under Montreal, Quebec City, etc.; fisheries of the St. Lawrence, Chaleurs Bay, and the coast varied and important, yielding an annual revenue exceeding $2,000,000. The early history of Quebec is that of Canada, beginning with the explorations of Jacques Cartier, 1534, 1535; city of Quebec founded 1608, and forts and fur stations established in various parts; early colonization more or less a religious enterprise, an adjunct to the Recollet and Jesuit missions. Government French up to 1759; territory ceded to Great Britain, 1763; Upper Canada set off, 1791; Lower Canada united to Upper Canada, 1841; by Act of Confederation, 1867, Quebec became a province of the Dominion.

Quebec, capital of province of Quebec and oldest city in Canada; mostly on a plateau and its ridges, at confluence of the St. Charles and St. Lawrence; 180 m. from Montreal and 300 m. from what is generally called the Gulf of St. Lawrence; pop, 78,190, about five sixths of the whole being French Canadian. The city, which covers an area of some 16,000 acres, has three main sections—the Upper Town, crowned by the citadel and facing the harbor at the Dufferin Terrace and the Grand Battery; the St. John Suburbs, on the N. slope of the plateau beyond the walls, meeting the level tract of St. Roch and St. Sauveur; and Champlain Street, running along the shore of the St. Lawrence under the steep sides of the plateau on the S. Dufferin Terrace stretches along the rock for a quarter of a mile at a height of 180 ft. It forms part of the line of fortifications around the city proper, and in summer is the favorite promenade of the citizens.

Public buildings and institutions in the Upper Town include the Parliament Buildings, Laval Univ. (largest Roman Catholic educational institution in Canada; adjacent seminary founded 1663), Citadel, covering 40 acres on the summit of Cape Diamond; the historic Basilica, where four French governors are buried; English cathedral, Chalmers (Presbyterian) Church, Church of Notre Dame des Victoires, built 1688; Château Frontenac, a hotel built near the site of the old Château St. Louis, once the residence of the French governors; the civic buildings; Ursuline Convent (1641), old military hospital, old government house. Places of interest in and about the city include the Plains of Abraham, with its monument to Gen. Wolfe, commemorating the battle of 1759; Wolfe's Cove, where the British landed, later gaining the heights; Près-de-Ville, where Gen. Montgomery fell, 1775; Montmorency Falls, where Montcalm kept Wolfe at bay for months before the decisive battle was fought; Beauport and its asylum; the island of Orleans, called Ile de Bacchus by Cartier; Levis, on the opposite side of the river, with its three commanding forts; the graving dock, capable of accommodating the largest vessel afloat; the Louise Embankment and its basin of safety for ships; Lorette, with its falls and ancient Indian church; the Chaudière Falls at the outlet of the Chaudière, etc.

Chief industries, the manufacture of leather, boots and shoes, cotton goods, steel, iron castings, rubber goods, musical instruments, tobacco, and peltries, and the shipping of lumber, grain, and cattle. The docks and wharfage properties extend from the mouth of the St. Charles round the river front for nearly 3 m. Lines of steamships connect with the principal European and with important American ports. The site of Quebec was visited by Cartier, 1535; city founded by Champlain, 1608; became the capital of the royal government established in New France, 1663; held by France till 1759, when it was taken by the British; unsuccessfully assaulted by Americans under Gen. Montgomery, December 31, 1775.

Quebracho (kā-brä'chō), evergreen tree (*Aspidosperma quebracho*) of Brazil and the Argentine Republic, from the bark of which may be obtained six different alkaloids. The aspidospermine of commerce practically represents all six of these substances. The bark is used in cases of disordered respiration, more particularly asthma.

Queen, wife of a king, or a woman who is the sovereign of a kingdom. In the former capacity her dignity is only inferior to that of her husband. As a sovereign princess she possesses all the attributes of a king, and her husband, if she is married, is her subject. The queen dowager is the widow of a king; and when she is mother of the sovereign she is commonly called the queen mother.

Queen Anne's Boun'ty. See BOUNTY, QUEEN ANNE'S.

Queen Char'lotte's Is'lands, small group in N. Pacific Ocean, about 80 m. from the coast of British Columbia; only Graham and Moresby are of considerable size; islands extend about 180 m. parallel with the coast of the mainland; greatest breadth, 60 m.

Queen Charlotte Sound. See VANCOUVER ISLAND.

Queen's Coun'sel. See KING'S COUNSEL.

Queens'land, state of the commonwealth of Australia; occupying the NE. part of the continent; bounded N. by Gulf of Carpentaria and

Torres Strait, E. by the Pacific, S. by New South Wales and S. Australia, W. by S. Australia and the N. Territory of S. Australia; area, 668,498 sq. m.; pop. (1905) 528,048; chief towns, Brisbane (capital), Rockhampton, Townsville, Charters Towers, Ipswich, Gympie, Toowoomba, Maryborough. Climate in the regions adapted for white colonists very hot and dry, but more salubrious than most other countries in same latitude; temperature in hottest parts seldom exceeds 95°; annual rainfall in S. half of E. Queensland, about 60 in.; on the NE. tropical coast, about 120 in.; on the plains, 10–30 in. Most important feature of physical formation, the backbone of hills known as the Great Divide, which extends along the E. coast from 50 to 200 m. inland; branching from this on the W. are the Selwyn and Grey ranges; highest elevation in state, Mt. Wooroonooran, 5,400 ft.; coast indented by many large bays; rivers include the Brisbane, Burdekin, Dawson, Mitchell, Flinders, Fitzroy, Leichardt, all shallow and not navigable for large vessels. Best agricultural region, the narrow part of the state; chief products, maize, wheat, barley, potatoes, hay, sugar cane, coffee, bananas, oranges, pineapples, grapes for wine; cattle and sheep raising an important industry. Chief exports, precious metals, coal, preserved and frozen meat, hides, skins, tallow, and sugar. Mineral products include coal, gold, silver, copper, lead, tin, antimony, mercury, wolfram, and graphite. Leading religious denominations, Church of England, Roman Catholic, Presbyterian, Wesleyan; primary secular education provided free by the state; franchise extended to women, 1905. Queensland, formerly a part of New South Wales, was created a separate colony, 1859.

Queens'town, town of Cork, Ireland; on Great Island; 12 m. SE. of city of Cork. The principal feature is a large Roman Catholic cathedral. Queenstown is an important port of call in connection with the carriage of the mails between the U. S. and the United Kingdom; was known as Cove until 1849.

Quelpaert (kwĕl'pārt), island about 60 m. S. of Korea, to which it belongs; 40 m. long and 17 m. broad. A mountain range traverses its entire length, culminating in the center in the Auckland (Halla San) peak, 6,500 ft. high; natives follow agriculture and fishing; chief towns, Chu Song, Chong-Hai, and Tai-Chong.

Quer'citron, dyestuff, the bark of the black oak (*Quercus tinctoria*), in some localities called the yellow-barked oak; largely employed in the U. S. as a dye; also reduced to a coarse powder and shipped to Europe for the same use, particularly in calico printing.

Querétaro (kā-rā'tä-rō), state of Mexico; between San Luis Potosi, Hidalgo, Mexico, Michoacan, and Guanajuato; area, 3,556 sq. m.; pop. (1900) 232,389; capital, Querétaro; chiefly engaged in agriculture and stock raising, with manufactures of cotton and woolen goods.

Quern, old-fashioned hand mill for grinding grain; in use in Asia at the present day, as well as in the Hebrides, in Ireland, and in various remote places; made of two stones, after the manner of millstones; or a rude mortar of wood or stone.

Quesada (kā-sä'thä), **Gonzalo Ximenez de**, b. 1498; Spanish military officer; b. Granada; became chief lieutenant of Pedro Fernandez de Lugo, Governor of Santa Marta, 1535; conducted an exploring expedition to the interior of the province; conquered the Chibchas of Bogota, and was elected governor of the new conquests, thus throwing off allegiance to Lugo. The city of Santa Fé de Bogota was founded, 1538. Quesada returned to Spain to present his claims to Charles V, but was dismissed for unseemly ostentation; led a dissolute life for many years; finally renounced all claim to the governorship, but was made Governor of New Granada, 1549; said to have died at a great age.

Quesnay (kā-nā'), **François**, 1694–1774; French economist; b. Méry; first physician to Louis XV; chiefly known as founder of the physiocratic school of political economy; regarded as inventor of the term political economy; advocated free trade in grain; chief work, "Tableau economique" ("Economic Pictures").

Quesnel (kā-nĕl'), **Pasquier**, 1634–1719; French theologian; b. Paris; entered the Congregation of the Oratory, 1657; became director of the Paris house of the order, 1662, and prepared his famous "Moral Reflections on the New Testament"; edited the works of Leo the Great and took occasion to defend the Gallican liberties; was forced to flee in consequence, and went to Brussels. His "Reflections" having been condemned as Jansenistic, and especially by the pope in the bull "Unigenitus," 1713, Quesnel was denounced to the Spanish police in Brussels, and fled to Amsterdam, where he lived in retirement.

Quetzalcoatl (kät-zäl-kwät'l), personage introduced into Mexican mythology by the Huastecas, a branch of the Mayas. He appeared in a long white robe, holding a staff; introduced the honors paid to the cross; taught the people many arts; established a system of worship; predicted the coming of the Spaniards; and was honored as a god, especially as the god of rain.

Quichuas (kē-chō'äs), chief people in empire of Peru under the Incas, who made their language the general one of their territory. The Quichuas extended from Lake Titicaca to Quito, and toward the coast to the territory of the Chinchas and Yuncas. Under the Incas they seem to have risen rapidly in many arts. They were assiduous cultivators of the soil, wove and spun wool, worked mines of gold, silver, and copper, built suspension bridges, erected adobe houses and temples, and constructed aqueducts. In astronomy they had not reached as high a degree as the Mexicans; they cultivated poetry, and had dramas and songs. The Incas claimed to descend from the sun, and introduced its worship. The priests of the sun dressed in white, and practiced celibacy and fasts; near each temple was also a convent of virgins of the sun. The Incas

were distinguished by the *llautu*, a fillet with a ball descending between the eyes. After the Spanish conquest the Quichuas lost much of the arts they had gained, and retrograded generally; but they still form an important element in the population of Peru.

Quick'sand, sand which yields so readily that any heavy body placed on it gradually sinks. Quicksands occur on beaches, in bars at the mouths of rivers, in the beds of streams, and are interbedded with formations on the land. Their unstable character renders them unfit for foundations and dangerous to men and animals which attempt to walk across them. Ordinary dry sand is compacted by pressure, and though moving somewhat when pressure is first applied, quickly becomes firm. A sand that is slightly moist has the same properties; but if water is present in such quantity as not merely to fill the interstitial spaces, but to hold the grains apart, friction is largely overcome and the mass yields to pressure.

Quick'silver. See MERCURY.

Qui'etism, movement within the Roman Catholic Church; originated from the devotional work of the Spanish priest Molinos, "Guida Spirituale," 1675. Quietism makes perfection on earth consist in uninterrupted contemplation, during which the soul remains passive or quiet, under the influence of the Spirit of God, and does not bestir itself enough even to make acts of faith, hope, and charity, to desire heaven, to hate hell, or positively to resist temptation. It met with much sympathy outside of the Roman Catholic Church, especially among the Pietists. Some of its disciples described their devotional feelings and exercises in a peculiar manner, which could not fail to call forth severe censure. Moreover, the emphasis which the Quietists laid on the inner state of the soul made the ceremonies and rules of the Roman Catholic worship seem superfluous, and provoked the rigid churchmen. Fénelon was their most conspicuous spokesman. The movement died out in the middle of the eighteenth century.

Quills, shafts of the large wing feathers of birds. They were formerly the almost exclusive material from which pens were made, and there is still considerable commerce in them. Quills are obtained chiefly from geese, but also from swans and other birds. Crow quills are valuable in some kinds of drawing. The so-called quills (spines) of the European porcupine have considerable commercial value. Quills are also used for making toothpicks, and for various other purposes.

Quince (kwĭnz), small tree (*Pyrus cydonia* or *Cydonia vulgaris*) of the rose family; native to W. Asia; fruit usually somewhat pear-shaped, yellow when ripe, and clothed with a flocky wool. The five cells are normally many-seeded; flowers expand directly from the terminal bud of small shoots of the season; blooming season two or three weeks later than that of most other fruit trees. The leading variety in the U. S. is the apple, or orange. The Angers quince is grown almost wholly as a stock on which to graft or bud the pear to make it dwarf. The Chinese quince is *P. cathayensis*. The fruit is much larger than that of the common quince, and wholly unlike

FRUIT OF THE QUINCE.

it. The flowering or Japanese quince (*P. japonica*) is a popular, low, thorny tree or bush, planted for hedges and ornament. Its fruits are used for jellies.

Quincy (kwĭn'zĭ), **Josiah,** 1744–75; American lawyer; b. Boston, Mass.; son of Josiah Quincy (1709–84), merchant; with John Adams, incurred odium by successful defense of British soldiers implicated in the Boston massacre; took part in town meeting which ordered "The Boston Tea Party"; went to England, 1774, to plead for the colonies; best known works, an address favoring a nonimportation act and "Observations on the Boston Port Bill."

Quincy, capital of Adams Co., Ill.; on the Mississippi River, here crossed by a bridge; 113 m. W. of Springfield; on a limestone bluff, 120 ft. above river. The notable buildings include the Cathedral of St. John (Protestant Episcopal), courthouse, U. S. Govt. building, group on the cottage plan comprising the State Soldiers' and Sailors' Home, surrounded by 210 acres of park, city hall. Here are Chaddock School for boys (Methodist Episcopal), St. Francis Solanus College (Roman Catholic), Gem City and Union business colleges, St. Mary's Institute (Roman Catholic), Blessing and St. Mary's hospitals. Manufactures include stoves, governors, machinery, carriages and wagons, agricultural implements, incubators, shirts and overalls, cigars and tobacco, flour and grist, brick, lime, saddlery and harness, and artificial ice. Pop. (census of 1910) 36,587.

Quincy, city in Norfolk Co., Mass.; on bay and river of same name; 8 m. S. of Boston; settled 1625; set off from Braintree as a town 1792; incorporated as a city 1888; noted for its extensive granite quarries and large shoe manufactories; also as a terminus of the first railway built in the U. S. (for transporting blocks of granite from the quarries to the site of the Bunker Hill Monument). It contains

Merry Mount and Faxon parks, large playground in each ward, celebrated Adams Academy, Thomas Crane Public Library, Woodward Institute; was the birthplace of John Hancock, John Adams, and John Quincy Adams. Pop. (1910) 32,642.

Quinet (kē-nā'), **Edgar,** 1803–75; French author; b. Bourg, Ain; became Prof. of Foreign Literature at Lyons, 1839; of Languages and Literatures of S. Europe at Collège de France, 1842; removed for liberal and anticlerical utterances, 1846; joined the Spanish revolution, 1848; member French Constituent and Legislative assemblies; banished, 1852; in National Assembly after 1870; works include "Philosophy and Poetry," "France and Germany," "The Genius of Religions," and the philosophical epics, "Ahasuerus," "Napoleon," and "Prometheus."

Quinine (kwī'nĭn), the most important medicinal ingredient of cinchona or Peruvian bark; discovered in 1820. Quinine is an alkaloid with strong basic properties, and forms with acids crystallizable salts. Its formula is $C_{20}H_{24}N_2O_2$. It is without smell, but has an intensely bitter taste; is insoluble in water,

CINCHONA.

but dissolves in alcohol and ether. Quinine is used in medicine principally in the form of sulphate or hydrochloride, the latter salt having the advantage of being more soluble. Quinine salts are locally irritant, and internally in small dose are stomachic; in large, powerfully disturbing to the nervous system. In small doses quinine stimulates the brain. In doses of 6 to 10 grains a day it is a tonic. In larger doses the most prominent symptoms produced are headache and deafness, with buzzing in the ears, muscular debility, and some reduction of the force and frequency of the pulse. In poisonous dose the individual may become completely blind, deaf, and paralyzed, but death is rare. Quinine salts are powerfully antiseptic, a small percentage preventing putrefaction and fermentation. These salts are used in medicine, especially to cure malaria, over which they have a specific power, by preventing activity in the peculiar micro-organisms of malarial disease. Three to five grains taken every morning during exposure to malaria and for some time thereafter will usually prevent the disease.

Quin'isext Coun'cil, Oriental Church council convened, 692 A.D., to supplement the acts of the fifth and sixth ecumenical councils; called also the Second Trullan Council, because it was held in the domed room of the imperial palace at Constantinople, called the Trullus. The Greeks consider it the seventh ecumenical council, but the Latins do not recognize it. It gave 102 stringent canons on clerical discipline, but allowed the marriages of priests to stand, provided they were first marriages and with virgins.

Quino'a, woody herb (*Chenopodium quinoa*), which, with other nearly related species, is cultivated in the highlands of Spanish America for its nutritious seeds; leaves used as a pot herb.

Quin'sy, acute suppurative tonsilitis, or inflammation of the tonsil, terminating in abscess. One attack usually predisposes to repeated attacks. Quinsy is most often unilateral, less frequently attacking the two tonsils successively. It occurs in persons of full habit, especially when the diet has been excessive. The exciting cause is some exposure to wet or cold. The attack is manifested by soreness of the throat, rigidity of the jaw, oversecretion of saliva, coated tongue, labored breathing, and sense of obstruction and tension in the throat. With the development of pus intense throbbing pain exists. It is usually remarkable how much constitutional disturbance results from local throat troubles of this kind. In grave attacks there may be a succession of chills; the temperature elevated to 102° or 104° F.; the pulse full and bounding; delirium at night, and by day the face expressive of great fatigue, suffering, and alarm. In from five to eight days the tonsil bursts and all the symptoms vanish. In its first stage quinsy may be aborted by scarification, by ice in the mouth, cold gargles, and astringent applications, as of alum or tannin, and by administration of saline cathartics and arterial sedatives or quinine. When developed, the inhalation of steam, warm gargles, soothing poultices or fomentations, tonics and diet to sustain the strength, and early evacuation of pus with the knife, are the essentials. Sudden death may occur when the abscess opens during sleep and the pus enters the air passages, or from hemorrhage when the internal carotid artery is involved by the suppuration. See TONSILITIS.

Quin'tal, weight of 100 or 112 lb., according to the scale used; employed chiefly in weighing fish.

Quin'tain, in olden times, an object, often in the form of a man, designed to the tilted at with a lance. It was sometimes placed at the end of a crosspiece so balanced on a pivot that if the rider were not very quick a bag of sand at the other end of the crosspiece would strike him in the back.

Quintana (kēn-tä'nä), **Manuel José**, 1772–1857; Spanish author; b. Madrid; became a lawyer; during part of War of Liberation was secretary of the Cortes and the regency; after the restoration his liberal principles led to his imprisonment; made preceptor to the infant queen, Isabella, 1833; senator, 1835; principal work, and one of the modern Spanish prose classics, "Lives of Celebrated Spaniards."

Quintil'ian, Marcus Fabius, abt. 35–96; Roman rhetorician; b. Calagurris, Spain; gained at Rome the highest reputation as a teacher of eloquence; received salary from fund established by Vespasian; was loaded with highest civil honors and titles by Domitian; greatest work, "Institutio Oratoria," on the art of oratory, which, besides its great historical interest, may still be read for practical purposes.

Quin'tus Cur'tius Ru'fus, Roman historian author of a work on Alexander the Great, "Historiæ Alexandri Magni Macedonis," composed under the Emperor Claudius. It was much read and admired during the Middle Ages. Of the author nothing definite is known. The narrative is by no means accurate, and is full of fables.

Quir'inal, one of the seven hills of Rome, N. and a little E. of the Forum. Like the Palatine it was originally the seat of a separate community, with religious and political institutions of its own. Aside from the ancient temple of Quirinus, restored by Julius Cæsar and Augustus, the most important buildings on the Quirinal, of which remains still survive, were the baths of Constantine and the baths of Diocletian. The palace on the Quirinal, built 1574 and used as a summer residence for the popes till 1870, and since then it has been the residence of the king of Italy. "The Quirinal" is often used as a synonym for the Italian court or government.

Quiri'tes, citizens of ancient Rome, synonymous with *populus Romanus*, or even added to it, as *populus Romanus Quiritium*. The singular *quiris* is very rare, and the plural form is used only in certain set formulas—*e.g.*, *Quirites* (as a form of address), *jus Quiritium* (full Roman citizenship), and the example given above.

Quit'claim, word employed in deeds in which the grantor or seller undertakes no responsibility in regard to the validity of his own assumed right to the property in question, but merely conveys to the grantee or buyer his own interest, whether valid or the reverse.

Quit'man, John Anthony, 1799–1858; American jurist; b. Rhinebeck, N. Y.; became professor at Mt. Airy College, Pa., 1819; practiced law at Chillicothe, Ohio, 1820–23; removed to Natchez, Miss., where he rose to distinction in profession and politics; chancellor of the Superior Court, 1828–31 and 1832–34; member of legislature, 1828–32; president of the Senate, 1835; judge of Court of Errors and Appeals, 1839; active in Texan struggle for independence; on outbreak of war with Mexico, appointed brigadier general of volunteers; promoted major general, 1847; distinguished at Monterey, Chapultepec, and assault and capture of Mexico City. Congress presented him a sword for his services at Monterey, and Gen. Scott appointed him Governor of Mexico City. Returning home at close of war he was elected Governor of Mississippi, 1850; member of Congress, 1855–58.

Quito (kē'tō), capital of Republic of Ecuador; on the Andine plateau, 9,250 ft. above sea; a few miles S. of the equator; 165 m. NNE. of Guayaquil; on the lower spurs of the Pichincha volcano, with Cayambé, Antisana, Cotocachi, Cotopaxi, Sinchalagua, Corazon, and Iliniza in plain sight, their snow-clad peaks forming a panorama of almost unequaled grandeur. The public buildings are generally of stone; the cathedral, government and archbishop's palace, and city hall are grouped about the Plaza Mayor, a handsome square and public garden. There are many churches and convents, public library, hospitals, observatory, and several educational institutions, including the ancient university, essentially a theological seminary. Many of the ecclesiastical buildings are adorned with paintings by native artists, and the city has a wide reputation as an art center. Quito is probably the oldest existing city in America, having been the capital of the ancient Quitu chiefs. It was taken by the Inca Tupac Yupanqui abt. 1470, was thereafter a favorite residence of the Incas, and when their empire was divided, 1525, became the capital of the N. portion. The Spanish general Benalcazar took it and founded the modern city, 1534. During the colonial period it was the capital of the presidency of Quito (now Ecuador). Pop. (1900) 50,000.

Quoits (kwoits or koits), game of strength and skill, in which the player strives to pitch a flattened ring of iron or steel (called a quoit) in such a way as to land it as near as may be to a peg or hob of iron stuck upright in the ground, or, if possible, to make it ring the hob. This game differs from the discus play of the ancients, in which the player threw a disk of metal or stone as far as he could, the longest thrower winning the prize.

Quo Warran'to, Writ of, or (as abbreviated) QUO WARRANTO, ancient common-law writ, in the nature of a writ of right, for the crown against a person or corporation claiming or usurping any office, franchise, or liberty, to inquire by what authority the claim was supported, or to determine the right. The respondent was commanded to appear and show by what right he exercised the office, franchise, or liberty, not having a grant of it, or having forfeited it for nonuse or abuse. The proceeding of *quo warranto* was long, and the judgment in it conclusive even against the crown. It is seldom used in the U. S.

R

R, eighteenth letter and fourteenth consonant of the English alphabet; is a lingual and a liquid or semivowel, being pronounced both before and after most other consonants; found in all languages except the Chinese and the tongues of some of the N. American Indians. See ABBREVIATIONS.

Ra, Egyptian "sun god," "father of gods and men," in whom in particular the solar worship of the Egyptians was centered. Heliopolis contained his principal sanctuary and was the center of his cult, which was very ancient. He was regarded as the offspring of the celestial ocean, and was believed to have appeared first at Heracleopolis, where he gained a victory over the "children of the rebels" and assumed divine rule over the world. So long as he was young his kingdom was strong, but with advancing age his subjects became rebellious. With the aid of Hathor he revenged himself on mankind and almost utterly destroyed them. Such are the main features of the myth of Ra. The "Adoration of Ra" was one of the chief and best known poems of the Book of the Dead.

Raba'nus, or **Hrabanus, Mau'rus,** abt. 776–856; German theologian; b. Mentz; founded at Fulda the first convent school in Germany, 804; wished to free the German Church from the influence of Rome, and succeeded in introducing the rule that the clergy should only preach in the native tongue; became archbishop of Mentz, 847; wrote "Glossaria Latino-theodisca" (now an important monument of the earliest phase of the German language), "De Universo," "De Arte Grammatica Prisciani," and several theological treatises.

Rab'bi, title of honor anciently employed by the Jews to designate those learned in the law, in which sense it is frequently found in the gospels; also used by disciples of other teachers; was applied to John the Baptist (John iii, 26) and to Jesus Himself (*e.g.*, Matt. xxvi, 25; 49; Mark x, 31; John i, 38). Luke employs the term *didaskale—i.e.*, teacher—but this is only the Greek translation of rabbi. The term *rab* is applied by Oriental Jews in a manner similar to the use of the English "esquire."

Rab'bit, English name for many species of the family *Leporidæ*, but more especially applicable to *Lepus cuniculus*; found throughout Europe (except in its more N. portions), as well as the contiguous portions of Asia and N. Africa; also naturalized in Australia, where it is a serious pest, and elsewhere. It lives in communities, burrows in the ground, and brings forth its young blind and naked. It is very prolific, beginning to breed at the age of about six months, and having several litters in the course of a year, and in each litter some four to eight young ones. In the U. S. the name is given to all species, the best known of which is the common small rabbit of the E. and middle states (*L. sylvaticus*); this species, as well as others of the family (*L. cuniculus* excepted), agrees with the hare in making forms instead of burrowing, and its young is provided with hair and is able to see. See HARE.

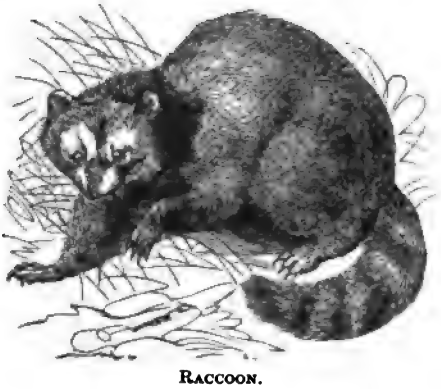
AMERICAN GRAY RABBIT.

Rabelais (rä-blā'), **François,** abt. 1490–1553; French author; b. Chinon, Touraine; ordained, 1511. His Franciscan fellow monks being fiercely hostile to his favorite study of Greek, Clement VII permitted him, 1524, to join the Benedictines; but, 1530, he went to Montpellier to study medicine, and subsequently became physician to Cardinal du Bellay, ambassador to Rome, who, 1536, obtained for him from Paul III a remission of the penalties for deserting his order. He was next a member of the abbey of St. Maur des Fossés, at Paris, till 1542, when he became curate of Meudon. His fame rests on his "Gargantua and Pantagruel" (*Les faits et dicts du géant Gargantua et de son fils Pantagruel*), in which he assailed all established authorities. *Gargantua* is supposed to stand for Francis I, *Pantagruel* for Henry II, *Grandejument de Gargantua* for Diana of Poitiers, *Panurge* for Cardinal de Lorraine, and other characters for various celebrated persons. Lord Bacon called Rabelais "the great jester of France"; others have called him a "comic Homer." His work abounds with good sense and folly, delicate thoughts and gross obscenities; but was entirely in accordance with the prevailing taste, and had a prodigious success.

Rabies (rā'bĭ-ēz). See HYDROPHOBIA.

Rabshak'eh, high officer in the Assyrian army, next in rank to the *tartan*, or field marshal. At times he seems also to have been employed as interpreter and ambassador. It is he who carries on the negotiations with the officers of King Hezekiah of Judah (702 B.C.) before the walls of Jerusalem, during the campaign of Sennacherib. A similar officer is sent by Tiglath-Pileser II on a mission to Tyre, 734 B.C.

Raccoon', or (often) **Coon**, common name for a small carnivorous mammal (*Procyon lotor*), the best-known member of the family *Procyonidæ*, a group nearly related to the bears; is about 2 ft. long, without the tail;



RACCOON.

body stout, tail rather short and bushy; feet furnished with slender toes; fore feet fitted for grasping; animal climbs well. It is readily tamed; is an amusing but mischievous pet; has the peculiar habit of washing its food; is found throughout the greater part of the U. S.

Race. See ETHNOLOGY.

Ra'chel, native of N. Mesopotamia; younger daughter of Laban; favorite wife of Jacob; and mother of Joseph and Benjamin. Her tomb, about 4 m. from Jerusalem on the road to Bethlehem, though of modern construction, undoubtedly marks the site of her burial, described in Genesis XXXV, 19, 20.

Rachel (rä-shĕl'), ELISABETH RACHEL FÉLIX, 1820–58; French actress; b. Mumpf, Switzerland; accompanied her father, a Jewish peddler, as a strolling singer and guitar player, and attracted attention while singing in a Paris café. Choron instructed her in music, and Saint-Aulaire in elocution. Her private performance of *Hermione* procured her admission, 1836, to the Conservatory; and, 1837, she appeared at the Gymnase Theater in a vaudeville, but without much success. In the meantime she studied under Samson, and on September 7, 1838, produced a great sensation as *Camille* in Corneille's "Les Horaces" at the Théâtre Français, and subsequently as *Phèdre* and in other personations of lofty classical heroines. The magnetism of her gestures and voice produced wonderful effects, and she combined the power of expressing the fiercest emotions with the utmost repose, grace, and dignity of manner. She also excelled as *Joan of Arc*, *Mary Stuart*, and *Adrienne Lecouvreur*; and during the excitement of 1848 produced a great effect by her thrilling rendition of the "Marseillaise." From 1849 she performed for six months annually in the French provinces, England, Russia, etc. In 1855 she visited the U. S. with her brother Raphael and her sisters Sarah, Lia, and Dinah.

Racine (rä-sēn'), capital of Racine Co., Wis.; on Lake Michigan, at mouth of Root River; 25 m. S. by E. of Milwaukee; has one of the best harbors on the lake; is connected with the principal lake ports by steamboat and propeller lines; and has considerable shipping of its own. The educational institutions include Racine College (Protestant Episcopal), St. Catharine's Academy (Roman Catholic), the McMurphy Home School (Protestant Episcopal), and Racine Academy (nonsectarian), and the benevolent institutions, St. Luke's Hospital and the Taylor Orphan Asylum. There are four libraries. The principal industries are the manufacture of agricultural implements, carriages and wagons, leather trunks and valises, and malt liquors. Pop. (1910) 38,002.

Racine (rä-sēn'), **Jean Baptiste**, 1639–99; French dramatist; b. La Ferté-Milon; gained fame, 1667, by his tragedy "Andromaque," and in rapid succession appeared "Les plaideurs," a comedy, and the tragedies "Britannicus," "Bérénice," "Bajazet," "Mithridate," "Iphigénie en Aulide," and "Phèdre," which made him the rival of Corneille. Owing to the intrigues of his enemies against the success of the last-named play, he devoted himself exclusively to his duties as historiographer of the reign of Louis XIV. At the suggestion of Mme. de Maintenon he wrote, 1689, "Esther," a biblical drama, for the Seminary of St. Cyr, and, 1691, "Athalie," one of his masterpieces. Louis XIV took umbrage at his memoir on the unhappy condition of France, which, 1697, Mme. de Maintenon had induced him to write. This produced a painful if not fatal impression on his health.

Rack, engine of judicial torture, formerly much employed in Europe to compel accused persons to plead guilty and to obtain satisfactory testimony from recusant witnesses; introduced into England, 1447, by the Duke of Exeter, constable of the Tower of London; 1628 was pronounced illegal by the courts. The victim was stretched on a platform of wood; cords were attached to his limbs, and then strained by pulleys until the sufferer yielded or had his joints dislocated.

Rack. See ARRACK.

Rack'ets, or **Racquets**, game originally similar to tennis, now played with a ball and racket bat in a closed court, about 60 ft. long and 30 ft. wide. The front wall has two lines

RACKET.

marked on it, the first (play line) 2 ft. from the floor and the second (service line) 8 ft. The half of the floor space farthest from the front wall is marked off into two courts by a line midway between the side walls. One player stands in each court. The first serves the ball so that it may rebound from the front

wall above the service line and strike in the opposite court, the second returns it above the play line, and so on. The server is allowed one "fault"—*i.e.*, if on his first attempt the ball strikes between the two lines, or rebounds to a part of the floor not his opponent's court, and the second player declines to return it, he may serve again. If the second player fails to return the ball properly, the first scores one; if the server fails, his "hand is out" and his opponent serves. The one who first scores fifteen wins.

Rad'cliffe Col'lege. See HARVARD UNIVERSITY.

Radetzky (rä-dĕts'kē), **Johann Joseph Wenzel Anton Franz Karl** (Count), Austrian marshal; b. Trzebnitz, Bohemia; entered the army, 1784; fought with distinction at Aspern and Wagram, 1809; at Kulm and Leipzig, 1815; commander in chief of Austrian troops in Italy, 1831; field marshal, 1836; put down the revolution in Milan and Venice, 1848, though then over eighty years old; won the victories at Custozza and Novara over the Piedmontese, and governed the Austrian possessions in Italy to February 28, 1857.

Radia'ta, one of the four great groups or branches into which Cuvier divided the animal kingdom, and which included those forms in which the parts radiated from a central axis, like the spokes from the hub of a wheel. It included as limited by him, the Cœlenterates, Ctenophores, Gephyrea, Polyzoa, Protozoa, and Parasitic Worms of later zoölogists. It was soon found that some of these forms had other affinities, and the ill-assorted group disappeared from European works about the middle of the nineteenth century, but lingered in the U. S. for twenty years more.

Radia'tion, a general name for the process of emission of various forms of energy from material bodies, or for the energy itself as it travels from one body to another: so called because the energy moves generally in straight lines or rays. According to modern ideas, when the energy is in the form of a wave in the ether, the ray is merely an imaginary line perpendicular to the wave front. In cases in which the energy is emitted as the kinetic energy of actually moving particles, the "ray" may be the path of these particles.

The most usual and most important radiation is that in the form of ether waves. These differ in wave length and in the effects that they produce. These effects were formerly thought to be the separate products of entirely different waves; hence the names "heat rays," "light rays," "chemical rays," "electro-magnetic radiation," etc. Ether waves vary in length from a fraction of a micron (a millionth of a meter, written as μ) up to infinity. The shortest hitherto measured (though there are doubtless others shorter) is 0.1 μ. From this up to 0.39 μ they are called "ultra-violet rays," and are invisible, being known only by their chemical and physiological effects. From 0.39 μ to 0.77 μ they constitute the visible spectrum (light rays) and have the power of stimulating the retina. Beyond 0.77 (infra-red rays) they are again invisible, though they may be detected for some distance by heat effects.

The chemical effects of rays extend into the upper part of the visible spectrum, and not only do the so-called heat rays include also the "light rays" of the lower, or red, end of the visible spectrum, but heat effects exist to some extent throughout. Between the heat rays and the shortest "electric," or "Hertzian," rays yet measured there is an unexplored region. Electric waves as short as 0.3 centimeter (3,000 μ) have now been produced, and they may be made as long as desired. All these waves consist of motions in the ether, transverse to the direction of propagation of the wave, and all travel with the same velocity—that of light.

Radiation is studied by means of its effects. That which affects the eye (light) is observed and measured by means of various optical instruments. The thermal, or heat, rays, including nearly all of the luminous rays as well as the infra-red, are studied by means of the thermopile, the bolometer, and other instruments for detecting and measuring heat. The ultra-violet rays are studied by their photographic effect, and the very long, or electro-magnetic, waves require special apparatus for their detection, like that employed in the receiver of a wireless-telegraph installation.

Until recently it was supposed that all radiation was a wave phenomenon, but this name in the last few years has been given to rays otherwise produced, such as the "X-rays" and the "Becquerel rays." The former are now believed to consist of impulses in the ether, instead of ordinary waves, and the latter to be due to particles actually emitted by the radio-active body.

Rad'icals, in chemistry, term applied to a group of elements that can pass unchanged through a series of compounds by chemical reactions. Thus in the salts formed by ammonia with acids the presence of the hypothetical radical *ammonium*, NH_4, is assumed. So, too, in all cyanogen compounds the group CN is assumed. Among the compounds of carbon such groups are very common, so much so that Liebig proposed the name chemistry of the compound radicals for organic chemistry. Thus alcohol is a compound of the group or radical ethyl, C_2H_5, with the group or radical hydroxyl, OH. Or alcohol is the hydrate of this radical; ether is the oxide $(C_2H_5)_2O$. Some of these organic radicals are called *residues* or *rests*. Thus ethyl, C_2H_5, is the *residue* or *rest* of ethane, C_2H_6. It is that which is left after one atom of hydrogen has been removed.

Ra'diograph. See X-RAYS.

Radiola'ria, subclass of Rhizopodus Protozoa which occur in the sea, at times extremely abundant; body divided into two portions, inner and outer, by a perforated membrane; inner portion is the nucleus, while the outer contains no nuclei, but gives rise to numerous radiating filaments of protoplasm. There is in addition, frequently, a skeleton, either horny or flinty, and often of extreme beauty.

The central protoplasm alone is concerned in reproduction, and in it are found spores which in turn develop into embryos.

Radiom'eter, in physics, any instrument for the detection and measurement of radiant heat. An early form was the differential thermometer of Leslie, which consisted of two glass bulbs, the necks of which were joined. The air contained within these bulbs is separated by means of a column of liquid. (See Fig. 1.) One of these bulbs being subjected to the radiant heat while the other was protected, the expansion of the atmosphere in the heated bulb served to drive the liquid column along the tube, bringing it to rest in a new position.

Many other forms of radiometer have been described, including the thermogalvanometer of D'Arsonval, the tasimeter of Edison, and

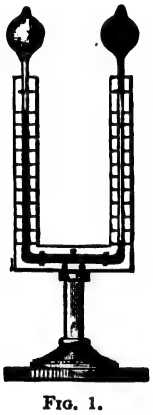


FIG. 1.

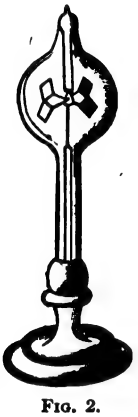
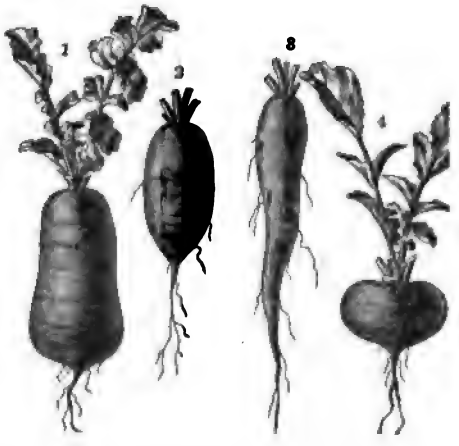


FIG. 2.

the selenium cell. The thermogalvanometer, which, under the name of the radiomicrometer, consists of a small light thermocouple of bismuth and antimony, closes upon itself so as to form a complete circuit. The same is suspended in a strong magnetic field by means of a quartz fiber. When one of the bismuth-antimony junctions is exposed to radiation differences of potential arise, and, since the circuit is of low resistance, a considerable current flows. In consequence of this current the suspended thermoelement tends to turn in the field, and the movement is noted by means of a very small light mirror and a telescope and scale. The tasimeter depends for its action upon the change of contact resistance of carbon with change of pressure. A vulcanite strip is so placed that one end of it rests upon a microphone button. Vulcanite possesses a large coefficient of expansion. When subjected to radiation its elongation is sufficient materially to compress the carbon button, reducing the resistance of the same, and thereby increasing the flow of the current through a galvanometer in circuit with the latter.

The instrument with which the name radiometer is most generally connected is Crookes's radiometer (Fig. 2). It consists of a set of four mica veins mounted at the ends of arms and revolving upon a needle point. The arrangement is inclosed in a glass bulb from which the air has been exhausted. Crookes found that when the atmosphere reached a certain degree of attenuation these mica veins began to revolve under the action of light.

Rad'ish (*Raphanus sativus*), plant of the mustard family, native of Asia, cultivated for its root, and used as a table relish. The root



VARIETIES OF RADISH. 1. Chinese winter. 2. Olive-shaped. 3. Long. 4. Turnip-shaped.

is stimulant, diuretic, and antiscorbutic. The seeds of some varieties yield an oil almost identical with rape and colza oil.

Ra'dium, an element, probably the rarest and at present the most costly in existence, characterized by very great radio-activity. This property, first discovered in certain other substances by Henri Becquerel, a French physicist, consists in ability to give off normally the radiation at first generally known, from his name, as "Becquerel rays." These have many properties in common with the Roentgen or X-rays, and are now believed to consist in part of such rays, or very similar radiation, together with very small particles in several forms. The supposed existence of such particles, smaller than atoms, has given rise to a new theory of matter, and in general the theories advanced to account for the unusual phenomena exhibited by radium and its congeners are regarded by many as having revolutionized the conceptions of modern physics.

Radium was discovered by Prof. and Mme. Curie, of Paris, as the result of a successful attempt to extract the radio-active principle of uranium, then the most radio-active substance known. It is now obtained chiefly from pitchblende, a uranium ore found mostly in the Hartz Mountains. It has not been isolated, but is sold in the form of some one of its salts, generally the chlorid. Of this only a few ounces are believed to be in existence. At first the continued emission of energy by the radio-active substances was thought to contravene the law of the Conservation of Energy, but it is now recognized that this emission is the result of a slow change taking

place in the substance of the body, as a result of which other bodies are produced. The "emanation," or material part of the radiation, appears to change into the gas helium, and radium is now regarded by many physicists as merely one stage in a series of transformations, beginning perhaps with uranium and ending with helium, and occupying altogether thousands of years, although certain of them are very rapid, like the final one between radium and helium, which requires only a few days.

The effect of radium on organic tissues resembles that of the X-rays, and many attempts to employ it in therapeutics have been made. Probably, however, its usefulness will be limited to effective cauterization in certain cases where ordinary methods fail or are difficult, as in the removal of inaccessible tumors. As in the case of X-rays, the continued application of the radiation produces severe and practically incurable ulcers. This was first discovered by an experimenter who carelessly carried a tiny vial of salts of radium in his pocket. The substance is now usually kept in bottles of lead, through which the radiation does not pass. It has been said that if a pound of radium could be isolated and placed in a room, no animal or human being could remain in that room and live. Possibly, however, the world's supply of radium is not so great as this. The possible distribution of radium throughout the earth's crust, its possible existence in the sun, etc., have led to some interesting speculations on its rôle in geological history, solar physics, and so on.

Ra'dius. See ARM.

Radowitz (rä'dō-vĭts), **Joseph Maria von,** 1797–1853; German soldier and statesman; b. Blankenburg, Brunswick; received military education at Paris and Cassel; fought in the campaigns of 1813 and 1815; removed, 1823, to Prussia, and held high military and diplomatic places, and for a short time, 1850, was Minister of Foreign Affairs; member of Frankfort Parliament, 1848, and on its dissolution chief agent in bringing about the union of the three kingdoms, an attempt to found a united German state under the leadership of Prussia.

Rae, John, 1813–93; British Arctic explorer; b. Orkney Islands; entered service of the Hudson Bay Company as a surgeon, 1833; made a boat journey (1846) along Hudson Bay to Repulse Bay; surveyed (1847) 700 m. of new coast line, connecting surveys of Ross in Boothia with those of Parry at Fury and Hecla Strait; took part in the expedition (1848) down the Mackenzie in search of Sir John Franklin, and explored the whole coast of the Arctic Sea between the Mackenzie and the Coppermine rivers; explored and mapped 700 m. of coast (1851), the S. shores of Wollaston Land and Victoria Land; proved the insular character of King William Land (1853); elicited from the Eskimos the first information obtained of Sir John Franklin's fate; and secured many relics of that party. For this discovery he received the admiralty grant of $50,000.

Raffael'le. See RAPHAEL.

Raf'fia, fiber obtained from the leaves of a palm indigenous to Madagascar, but found also on the E. African coast; consists of strips of the inner skin of the leaves, which, after they are peeled, are dried in the sun. In the green state it is woven by the natives into a kind of sacking; split infinitesimally fine, is used as a warp for a tissue the weft of which is white silk. Its softness, the facts that it does not break or ravel when folded or knotted, and that it is unaffected by moisture or change of temperature, make it useful to gardeners for tying up vines and flowers, grafting, etc. It is used in kindergartens for weaving baskets and other articles. For export the fiber is collected in skeins, twisted up or plaited, and then baled like raw cotton. The leaves of the palm yield a valuable wax; the ribs of the branches are used by the natives as shafts for palanquins and ladders; and the ribs of the leaves are utilized for making baskets and dredges for catching fish.

Raffle'sia, genus of plants of the family *Rafflesiaceæ*, natives of Sumatra and Java, and parasitic on stems and roots of *Cissus*; are nearly stemless, rootless, and leafless, being little more than mere flowers, with a few scales for leaves; seeds rudimentary, and embryo small and few-celled. The plant has a fungus-like, fleshy appearance, and a strong odor of carrion. *R. arnoldi* is considered the largest flower in the world—3 ft. in diameter; has been known to weigh 15 lb.; is worshiped by the Javanese.

Rafn, Carl Christian, 1795–1864; Danish archæologist; b. Island of Funen; while deputy librarian at the Univ. of Copenhagen, published from the manuscripts "Antiquitates Americanæ, seu Scriptores Septentrionales Rerum Ante-Columbianarum in America," prefaced by a summary in English, maintaining that the Scandinavians discovered America in the tenth century, and from the eleventh to the fourteenth made frequent voyages thither, effecting settlements in what is now Massachusetts and Rhode Island.

Rag'lan, Fitzroy James Henry Somerset (Baron), 1788–1855; British general; b. England; youngest son of the Duke of Beaufort; distinguished himself on Wellington's staff in Spain, and at Waterloo lost his right arm; 1818 and 1826, was elected to Parliament, and, 1852, made master general of the ordnance and raised to the peerage. In the Crimea he was commander in chief with rank of field marshal, and, September 20, 1854, fought the battle of the Alma. The subsequent sufferings of the troops, and the repulse of June 18, 1855, aggravated a sickness of which he died.

Ragnarok (räg'nä-rĕk'), in Scandinavian mythology, the final dissolution of the cosmic world, when gods and giants and men destroy one another in an internecine feud. Depravity and strife in the world proclaim the approach of the great event, which is preceded by a fall of snow from the four corners of the world, cold, piercing winds, tempestuous weather, the absence of summer, and convulsions of nature.

Kindred slay each other for mere gain. The Fenris wolf is freed from his chains, and the Midgard serpent gains land. The heavens are rent in twain, and the sons of Muspel come riding through the opening in brilliant array to the battlefield called Vigrid. Thither repair also the Fenris wolf, the Midgard serpent, and all the forces of evil. The gods, who assemble without delay, arm themselves with speed, and sally forth to the battlefield, led by Odin. Odin is swallowed by the Fenris wolf, and the wolf is killed by Vidar. Thor kills the serpent, but falls suffocated by its venom. Finally the earth, consumed by fire, sinks beneath the sea. After Ragnarok there is a new green earth, and there comes a new golden age in which all will be good and happy. Then comes the Mighty One, he who is from everlasting to everlasting, and establishes peace and good will among gods and men.

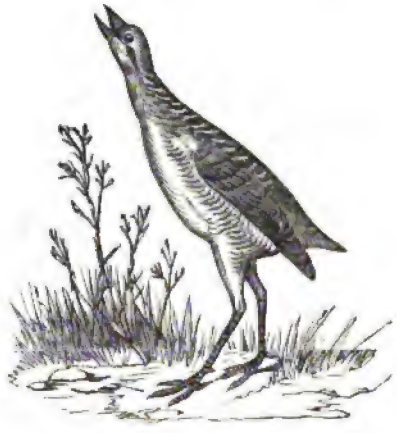
Ragu'sa, town of Austria, in Dalmatia, on the Adriatic; was the capital of a mediæval aristocratic republic, and during centuries the chief city on the E. Adriatic; rivaled Venice in activity and wealth and Florence in literary life, being commonly called the Slavic Venice; its land trade was enormous; frequent caravans brought raw materials for export and manufacture, and took manufactured goods away. In 1364 it made a treaty of alliance with Murad I, the first concluded between a Christian state and the Ottomans; 1421, obtained from the Holy See special privileges or a sort of monopoly of trade with the Mussulmans; after 1453, paid tribute to the Ottomans, but was always favored and protected by them. In 1815 the republic was ceded to Austria. Of its two harbors, Porto Cassonne is used only by fishing boats, but Gravosa, 2 m. N., is the finest port on the Dalmatian coast. As the bulk of the population of Dalmatia was S. Slav., while the portion occupying the coast towns was Italian, both the Jugo-Slavs and the Italians claimed the province at the Peace Conference, after the World War, and the solution of the problem was left open temporarily.

Râhu (rä'hō), in Indian mythology, the demon who is imagined to be the cause of the eclipses of sun and moon.

Raiæ (rā'yē), according to some authors an order, and to others a suborder, of the class of *elasmobranchiates*, including the rays, torpedoes, and related types. The form varies considerably in the several members of the order; on the one hand, the sawfishes have an outline much like that of the sharks, and with a long caudal portion; and on the other hand, the eagle rays and certain sting rays have a disk extremely wide—much wider than long—and the caudal portion is reduced to a whip-like appendage.

Raikes (rāks), **Robert,** 1735-1811; English philanthropist and originator of Sunday-schools; b. Gloucester; succeeded his father as editor and publisher of the *Gloucester Journal*; founded a system of Sunday-schools for poor children, 1781; witnessed its extension to most of the towns of England and the U. S.

Rail, popular name for any member of the *Rallidæ*, a family of marsh-haunting birds, having stout legs, long, slender toes, weak wings, a compressed body, and, usually, a rather long bill. Rails are widely distributed throughout the world, and range in size from little larger than a sparrow to about 15 in. in



Carolina Rail.

length, or, if the courlan be counted a rail, 2 ft. They fly poorly, but run among the reeds with ease. The common rail of Europe is *Rallus aquaticus*; the common species of the U. S. are the Virginia rail (*R. virginianus*) and the sora, or ortolan (*Porzana carolina*). Both are found over the greater part of temperate N. America, and are especially abundant during the fall migrations in the marshes and rice fields of the S. Atlantic States.

Rail'way, or **Rail'road,** road with parallel tracks of iron rails upon which the carriages run. The plan of facilitating the draught of carriages by forming a hard continuous sur-

Fig. 1.—Stephenson's "Rocket," 1829.

face for the wheels to run upon is old and simple. The use of iron was found to reduce the friction very sensibly; a ledge or flange on the outer edge of the plate of iron forming the rail enabled the ordinary wagon to keep on the rails without difficulty. This kind of track

was long in use, and was known as a tramway. The next improvement was the introduction of the edge rail, formed by setting up a bar of cast or rolled iron in the form of a T. This required special supports called "chairs," spiked to the timber rails or to cross supports of timber called "ties," or at intervals to stone blocks. To produce uniform strength between the points of support, the iron rail was made of an elliptical profile—that is, the upper part of the T upon which the wheels rolled was a straight line, while the stem of the T varied in depth, being thinnest at the points of support and deeper intermediately. These constituted the "fish-bellied rail," for a long time considered the proper form for iron rails.

Fig. 2.—De Witt Clinton's Engine and Train, 1831.

In 1802 Trevithick took out the first patent for adapting a steam engine to move upon a road, although Watt is said to have invented one previously. As early as 1804 steam was used as a means of propulsion on some of these roads, but the speed was not greater than that of horses, owing to the imperfect construction of the boilers of the engines; and on grades as low as 18 ft. per mile they required to be assisted by auxiliary power of some sort.

In 1825 the Stockton and Darlington Railroad, 37 m. in length, was completed, and was the first railroad built for general traffic. It was the intention to operate it with horses, but locomotives were soon applied to it. The increased commerce between the manufacturing town of Manchester, England, and Liverpool led to chartering the Liverpool and Manchester Railroad in 1828, its main object being the transport of merchandise between the two places. In 1829, as it approached completion, an inquiry was instituted as to the respective merits of stationary and locomotive steam power, and the directors of the road were induced to offer a reward for a locomotive engine which should be able to take three times its own weight on a level road at a speed of 10 m. per hour—such performance being then unknown—the price of the engine to be restricted to £550. In October of the same year the trial was had, and an engine built by Robert Stephenson, Jr., more than performed all the stipulated requirements; weighing but 7½ tons, it drew 44 tons at the rate of 14 m. an hour. But this success was not decisive as to the applicability of the locomotive to our American roads. An English road was virtually a straight road; an American road had curves sometimes of as small a radius as 200 ft. It was thought that this might debar the use of locomotives. To Peter Cooper is due the construction of the first American locomotive, built for the Baltimore & Ohio road, to show that steam might be adapted to curved roads. A trip made to Ellicott's Mills, drawing a car filled with the directors and others, was the first land journey by steam in America. Electricity is now fast being substituted for steam locomotives in the operation of railroads here and in Europe, the expense being less than that of steam. See Locomotive.

The principles of the construction of the accessory works of a railroad, such as embankments, bridges, tunnels, etc., differ in no essential save dimensions from those required for first-class turnpike roads; but the location of the curves, or horizontal deviations from a right line; the grades, by which we understand the rise or fall in the direction of the length of the road; and the gauge, or width between the rails of the track, are the elements which determine the capacity or classification of a railroad as a machine for transport, and require careful study. The precise amount of resistance to locomotion occasioned by curves in a road has never yet been accurately determined. It is partly due to the effect of centrifugal force, causing the flange of the outer wheel of the cars to press against the rail; partly to the dragging of the wheels, which, being necessarily fixed on the axle, are obliged to perform an equal number of revolutions whether on the inner and shorter or outer and longer rail of the track; and partly to the axles being fixed parallel. The velocity of the train being an element in the calculation for the superelevation of the outer rail of the

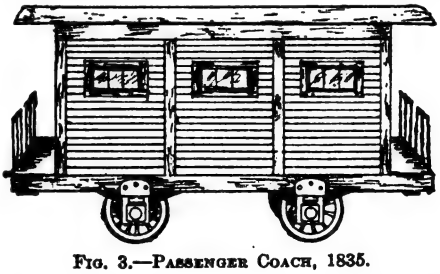


Fig. 3.—Passenger Coach, 1835.

track, what would be suitable for one speed of train would be unsuitable for another; hence a compromise has to be made, and the average speed of passenger trains is usually taken from which to calculate this superelevation:

If v = speed of train in miles per hour,
r = radius of curve, in feet,
g = gauge of track,

then $g \times \frac{v^2}{15r}$ = elevation to be given to outer rail of track. The additional resistance to motion occasioned by the various grades or

inclinations in a road is susceptible of precise calculation, and is a constant quantity for the same inclination, let the state of the road or the machinery be what it may, and is as the sine of the angle of inclination; or, virtually, it is that fraction of the weight which is represented by dividing the height of a given inclination by its length.

If a locomotive engine be prevented from advancing on the track, and at the same time the proportions of the machinery be such that upon the application of the power to the wheels the latter will revolve by slipping on the rails, the engine is said to work up to its adhesion, and the latter becomes the limit of its traction force. This adhesion varies, in different states of the rail surface, from $\frac{1}{3}$ to $\frac{1}{10}$ of the weight on the driving wheels, and may be taken ordinarily at $\frac{1}{4}$ of the insisting weight. If, then, we know the resistance to motion occasioned by the friction at the axles of the wheels of the engine and train, as also of the rolling of their surfaces on the rails, by dividing the adhesion by this amount we shall have the weight which the engine will draw on a level under the assumed condition of the rails and the machinery. The resistance of gravity is the same on a given plane at all speeds, but is overcome twice as fast at 20 m. per hour as at 10 m., and hence is said to vary with the speed. Friction is the same at all velocities, but varies with the load of the train; concussion, or resistance of the curves, varies both with the weight and speed of the train. Atmospheric resistance varies with the speed and bulk of the train.

It is not known what, if any, principle governed the determination in the first instance of the gauge between the rails of 4.8½ in. It was adopted in the roads from the collieries in the N. of England, believed to have arisen from the colliery wagons in use on common roads having an outside width of axle of 5 ft., and the tram roads having the flange on the outer edge of the rail admitted of their use also on the railroads; and when the tramway was replaced by an edge rail the same width of track was continued, but, measured from the inner edge of the rail, resulted in the 4 ft. 8½ in. gauge. Be this as it may, Mr. Stephenson, engaged in these collieries, was selected to build the Liverpool & Manchester road, and seeing no reason to change the gauge with which he was familiar, it was adopted there. When once established on a line of road looking to future extension, it was apparent that unless some special advantage called for a change there was a manifest propriety in continuing its use; accordingly, the success of the Liverpool & Manchester road led to the general adoption of this gauge. As the weight of traffic increased, and a corresponding increase of power was called for in the locomotive engine, the impression prevailed that this could be best arrived at by increasing the space within which the machinery was placed, and an increase in the width of track on many roads was the consequence. In 1846 the inconvenience resulting from this lack of uniformity in the width of the railroads in England led to the matter being brought before Parliament. The commotion which followed, known as the "battle of the gauges," led to experiments, investigations, and reports by a committee of Parliament. The result was, that while Parliament declined to enact a law compelling all roads to adopt the narrow gauge, yet the evidence went to show that while for main trunk lines of great traffic a wider gauge than the prevailing one of 4 ft. 8½ in. would probably prove advantageous, yet the advantages were not then so apparent as were the disadvantages resulting from a lack of uniformity with the prevailing gauge of the country; and the public mind settled generally to this belief. We have several different widths of track in this country.

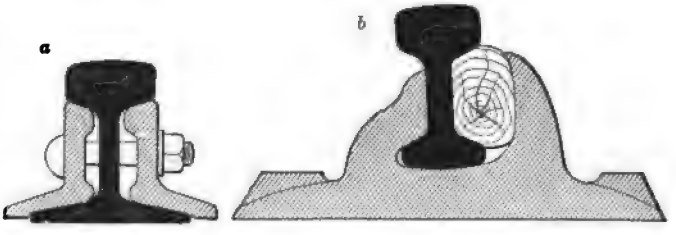


FIG. 4.—RAILS. *a*, T rail; *b*, bullhead rail.

The history of all failures in earthwork shows that in almost all cases it arises from unskillful or inadequate drainage; and the expense of the maintenance on any line will, other things being equal, vary very nearly in the proportion which its drainage is good or otherwise. Ballast consists of porous material, on which the cross-ties rest, and in which they are bedded. The cross-ties, of oak, chestnut, or other hard and durable wood, from 6 to 8 in. in depth, from 8 to 10 in. wide, and a foot in length, are laid usually upon the roadbed at intervals of about 2 ft. between centers, upon which the iron rails are secured by brad-headed spikes ⅝-in. square and 6 in. in length. The material upon which the ties rest should be broken stone or gravel mixed with coarse sand free from loam or clay, and to a depth of at least 18 in. below the bottom of the ties, and the space between the latter should be filled in nearly to the level of the bottom of the rail.

Steel has now entirely superseded iron in the making of rails. In Europe it is customary to make the rail double-headed, and when worn on one edge to reverse it, and thus double its duration; but this method, beside rendering an expensive cast-iron chair necessary, with its complication of fastenings, is of doubtful expediency, as the effect of the chair is in many cases to indent the lower face of the rail. The system universally pursued in this country of dispensing entirely with a chair, and making the base of the rail some 4 in. in width, resting on the timber cross-ties without other support, and

secured to the latter by two brad-headed spikes, is gradually gaining ground elsewhere as the most simple and efficient method of securing the rail. The roadbed of to-day has rails weighing from 85 to 110 lb. to the yard, 100 lb. being the weight now most frequently used.

With the exception of variations in the width of gauge and weight of rail, and the details of the rolling stock, the railways of the U. S. present great uniformity of plan. To this statement an exception must be made in the case of the roads operated by electricity, for the use of electricity has rendered some changes in the construction of the rail track essential, and still greater changes may be anticipated in the future. During the five and one half years ending with 1907, the total mileage of electric railways, urban and interurban, increased 53.4 per cent. The construction of interurban lines has been going on in most parts of the U. S., but their progress has been exceptionally rapid in New England, New York, in the central West, and in S. California. In the State of Massachusetts alone there are 2,223 m. of electric lines, and this exceeds the line of mileage of steam railroads by 112 m.

In France the earliest railway was the Chemin de Fer de St. Étienne à Lyon, 34 m. in length, double track, commenced in 1826, finished in 1831. The roads connecting Paris with Lyons, Orleans, and Havre soon followed. In Austria one of the earliest roads connected Budweis and Linz, and another Linz and Gmunden. These were single-track roads, worked by horse power, with wooden rails covered with iron plates. In Switzerland, Italy, Spain, and Turkey, for obvious reasons, the development was less rapid. England soon recognized the importance to her Asiatic possessions of binding them together by railway connections. A similar need was felt by the Russian Govt. The road from St. Petersburg to Moscow was the first great road undertaken.

Gridley Bryant, the inventor of the eight-wheeled car, the turntable, and the switch, was the projector, builder, and engineer of the first railroad in America—the Quincy, in 1826. It is a matter of interest that it was built to supply the Quincy granite for the Bunker Hill Monument. It was 4 m. in length; near the quarry was an inclined plane of 315 ft. length, rising 84 ft., worked by gravity. The Quincy was followed in 1827 by the Mauch Chunk road. The New Orleans and Lake Pontchartrain Railroad, the first in the U. S. laid with T-rail, was built in 1830–31, under supervision of the first graduate of the U. S. Military Academy, the late Gen. J. G. Swift. Between the years 1828 and 1833 our actual system of railway communication may be said to have been inaugurated by the commencement of the Baltimore & Ohio, the Baltimore & Susquehanna, the Camden & Amboy, the New Castle & Frenchtown, the Hudson & Mohawk, the Charleston & Augusta, the Boston & Providence, the Boston & Lowell, and other roads. The Baltimore & Ohio and (at a later date) the Pennsylvania roads, connecting the Ohio with Baltimore and Philadelphia, the Mobile & Ohio, connecting that river with the Gulf, may be called the first through lines. The imperious necessity of connecting our newly developed Pacific states with the older body gave rise to the most extended system of reconnaissance and survey through a vast expanse of mountain chain and desert for the determination of practicable routes, and finally to the rapid construction of the most remarkable through lines of railway in the world.

Louis Brennan, a British engineer, has recently successfully applied the principle of the gyroscope to railroading. By means of two gyroscopes, revolving in opposite directions at a high rate of speed, he kept a small car having a single row of wheels in perfect balance upon a single track. High speed and perfect balance were maintained over an irregular track with curves and grades.

The congested conditions of street traffic in large cities has necessitated the construction of elevated railways which are operated by steam or electricity. Elevated railways are usually constructed on one or the other of the following plans: In one case the track rests upon girders placed longitudinally upon two rows of columns placed along the street at intervals of about 40 ft. and the necessary width of the track apart. The columns are bolted to a masonry foundation and usually consist of two or more uprights latticed together. In the other plan the columns are joined laterally by transverse girders, and upon these rest the longitudinal girders that carry the track. The latter method gives greater stability. Elevated railway construction was first undertaken in New York about 1871. In 1909–10 there were 2,290,331 cars and 58,947 locomotives in service on railroads in the U. S. The number of passengers carried in 1890 was 492,430,865, and in 1910, 971,683,199; there were 631,740,636 tons of freight carried in 1890, and 1,849,900,101 in 1910. The total mileage of U. S. railroads in 1879 was 86,556; in 1910, 249,992. See STREET RAILWAYS.

The fastest recorded short-distance runs on railroads in the U. S. are as follows:

Date.	Railroad.	Terminals.	Distance. Miles.	Time, m. s.	Miles per Hour.
May, 1893	N. Y. Cent. & H. R.	Crittenden—"Empire State Express"	1	0.32	112.5
Aug., 1895	Pennsylvania	Landover—Anacostia	5.1	3.00	102
Jan., 1899	Burlington Route	Siding—Arion	2.4	1.20	108
Mar., 1901	Plant System	Run from Fleming to Jacksonville	5	2.30	120
Jan., 1903	N. Y. Cent. & H. R.	Palmyra—Macedon	7.29	4.00	109.35
April, 1904	Michigan Central	Crisman—Lake	3.73	2.00	111.90
July, 1904	Philadelphia & Reading	Egg Harbor—Brigantine Junction	4.8	2.30	115.20
Oct., 1904	N. Y. Cent. & H. R.	Croton—Ossining	3.51	2.00	105

Raimondi (rī-mŏn'dē), **Marcantonio,** abt. 1480–1534; Italian engraver; b. Bologna. His imitations of Dürer's prints were sold for originals in Venice. Dürer sought redress, but only succeeded in preventing the use of his monogram. Subsequently Raimondi acquired great celebrity in Rome, and when it was sacked, 1527, returned to Bologna. For purity of outline, correct expression, and drawing he was one of the best of engravers. The British Museum has 500 of his choicest productions.

Rain, moisture of the atmosphere condensed into drops large enough to fall with perceptible velocity to the earth. The water thus precipitated is quite pure, except in so far as it absorbs a little air, carbonic acid, ammonia, or nitric acid from the atmosphere. The formation of rain is in general a continuation of the processes of the formation of clouds, dew, and fog. The deposition of moisture depends on the cooling of the atmosphere. In general the temperature of a given mass of warm moist air is lowered by one or another of the following processes: (1) By radiation to the cold sky; (2) by radiation to neighboring masses of cold air, or the cold ground; (3) by mixture with cooler air; (4) by the absorption of heat in the expansion of ascending air. Radiation takes place especially at night during the winter, when the upper regions of the atmosphere contain but little moisture to hinder the free radiation of heat, but the result is far more frequently snow or cloud than rain. The third process depends for its effect on the principle that the density of saturation increases faster than the temperature. The fourth process is the most efficient of all in lowering the temperature and producing rain. The distribution of rainfall over the world may be briefly classified as follows: First, a strong contrast between the torrid zone and the polar regions, the latter having a lighter fall because of the slow loss of capacity when air cools at low temperatures. Second, a contrast between continental borders and interiors, in favor of the former. Third, a contrast between high and low lands, with greater rainfall on the former. Fourth, a contrast between the windward and leeward mountain and continental slopes, the latter being drier. In all this it is perceived that the distribution of rainfall is not a fortuitous matter, but that it is closely dependent on the fixed order of nature.

Rain'bow, a bow, or an arc of a circle, consisting of all the prismatic colors, formed by the refraction and reflection of rays of light from drops of rain or vapor, appearing in the part of the heavens opposite to the sun. When the sun is at the horizon the rainbow is a semicircle. When perfect, the rainbow presents the appearance of two concentric arches, the inner being called the primary and the outer the secondary rainbow. Each is formed of the colors of the solar spectrum, but the colors are arranged in the reversed order, the red forming the exterior ring of the primary bow and the interior of the secondary. The primary bow is formed by the sun's rays entering the upper part of the falling drops of rain and undergoing two refractions and one reflection, and the secondary by the sun's rays entering the under part of the drops and undergoing two refractions and two reflections. Hence, the colors of the secondary bow are fainter than those of the primary.

Rainbows are sometimes produced by the sun's rays shining on the spray of cascades, fountains, etc., and then a whole circle can frequently be seen. A broken rainbow mostly occurs from the field not being filled with falling rain, but it will also happen when the sun is invisible from part of the field. The moon sometimes forms a bow or arch of light, more faint than that formed by the sun, and called a lunar rainbow. A spurious or supernumerary rainbow is a bow seen in connection with a fine rainbow, lying close inside the violet of the primary bow, or outside that of the secondary one. Its colors are fainter and more impure, as they proceed from the principal bow, and finally merge into the diffused white light of the primary bow, and outside the secondary.

Rain Gauge, instrument for measuring the amount of rain which falls on a given area during a certain time. For approximate purposes a tub or bucket may be employed, with a thin-edged mouth, placed in a horizontal position for catching the rain, whose depth may afterwards be measured by a graduated rod. It is more common, however, to catch the fall in an accurately made funnel, whence, it flows into a holder, after which it may be measured. Self-recording gauges are made, by which record is kept of the time and rate of fall of every shower. Snow is difficult to measure, as it is liable to gain or loss by drifting. The gathered snow is melted by adding a known amount of warm water, the total then being measured as before.

Rainier (rā'nēr), **Mount,** volcanic peak standing alone on the W. slope of the Cascade Range in State of Washington. Within a small crater at the top there is some solfataric action, suggesting that the volcano may not be extinct; but the date of the principal eruptions is so remote that subsequent erosion has scored the sides of the cone with deep cañons. In these are a series of glaciers, the largest in the U. S. S. of Alaska. The mountain rises about 9,000 ft. above its base, and its summit is 14,363 ft. above the sea. Its lower slopes are densely wooded. Vancouver, the navigator, named it in honor of Admiral Rainier, of the British navy. Current usage is divided between this name and Tacoma.

Rai'ny Lake, large lake on the boundary between Minnesota and Canada; receives the waters of the Nameken and many other rivers, and discharges its own waters through Rainy Lake River into Lake of the Woods; abounds in small islands; contains a great supply of fish of several species; elevation, 1,035 ft.

Rai'sin, dried fruit of the sweeter sorts of grapes, grown in warm climates, and mostly dried in the sun. As this requires a practically rainless period of several weeks, the production of raisins on a commercial scale is

limited to a few specially favorable climatic regions—*viz.*, the S. of Spain, Asia Minor, Greece, a portion of Calabria and Sicily, S. California, and Chile. Three kinds of grapes are commonly used in making raisins. The large Spanish raisins are made chiefly from the white Muscat (Muscat of Alexandria), in the provinces of Malaga and Valencia. The medium-sized or small, light-colored, seedless raisins are the fruit of the prolific Sultana grape, known in Asia Minor and the Ionian Islands; while the smallest of all, the currants (properly Corinths), are derived from a very small-berried but large-bunched grape, grown in the same region, of which there is a black and a white variety, the former being the one generally used. Raisin grapes must be pulpy, and should acquire not less than twenty-eight to thirty per cent of sugar in their juice.

Raisin Riv'er. See MONROE, MICH.

Rai'suli (MULAI AHMED BEN MOHAMMED ER), b. abt. 1867; Moorish brigand; member of an aristocratic family and a direct descendant of Mohammed; adopted a life of brigandage and blackmailing, and with his followers terrorized the neighborhood of Tangier; was betrayed and imprisoned, and his property confiscated; in revenge kidnaped, 1904, Ion Perdicaris and his stepson, American and British subjects respectively, demanded a ransom of $70,000, the governorship of Tangier and adjacent districts, and the removal of the existing governor, his betrayer. The presence of a U. S. fleet in the harbor of Tangier, and the pressure of the British and French govts., caused the Sultan of Morocco to accede to Raisuli's demands. Restored to power, Raisuli renewed his acts of rapacity and atrocity, and attempted to incite a holy war against the Christians. On demand of the European representatives in Morocco, he was deposed December, 1906, and retired to Zinat, a stronghold, whence, January, 1907, he was driven by the Sultan's forces, and forced to take shelter in the mountains. In July, Sir Harry MacLean, commander of the Sultan's bodyguard, was sent to persuade the bandit to come to terms, but was forcibly detained, Raisuli demanding an indemnity of $200,000 and his own reinstatement as governor. England agreed to pay Raisuli a ransom of $100,000 and guarantee his immunity.

Rajah (rä'jä), title of many princes in the East, assumed by many of the Rajput caste, and by the great landowners, even of low caste. Some princes have assumed the title maharajah, or great rajah.

Rajputana (räj-pō-tä'nä), collective name of twenty native states of India, under the protection of the British Indian Govt., ruled by rajahs, covering an area of 128,980 sq. m., mostly desert or semiarid plains; E. of the lower Indus and S. of the Punjab. Through the E. run the Aravalli Hills, and fertile districts watered by streams from these hills contain the two largest and finest towns, Jaipur and Jodpur. The Thar, or great sandy desert of N. India, lies in the W. The SE. region is the most fertile. The chief British agent regulating these states resides at Ajmere, a small territory under the direct rule of the viceroy. Nine tenths of the people are Hindus, and the Rajputs among them number only about 800,000, but they are the ruling element, and give their name to the territory. Pop. (1901) 9,841,765.

Rajputs', members of the Hindu race who claim to be descendants of the original Kshatriya or warrior caste. They strongly resisted the Mohammedan invasion, but were finally subjugated. They joined the Mahrattas against Aurungzebe, and were subsequently harassed by various marauding armies, but by 1761 they had become practically independent. Subjected to exactions from the Mahrattas and Pindarees, the principal Rajput states voluntarily placed themselves under the English, 1818.

Rákóczy (rä'kō-tsē), noble family of Transylvania, several members of which were princes of that country. GEORGE I (1631–48) coöperated with the Swedes in the Thirty Years' War, and forced Ferdinand III to restore the liberties of Hungary by the Treaty of Linz (1645). The most celebrated member of the family was his grandson, FRANCIS II (1676–1735). In 1701 he was imprisoned in Austria on a charge of conspiracy, but escaped. In 1703 he raised an insurrection against Austria, and, subsidized by Louis XIV, then engaged in the War of the Spanish Succession, soon conquered most of Hungary and Transylvania. In 1705, after he had been elected Prince of Transylvania, a confederation of revolted Hungarian districts appointed him chief. In August, 1708, while investing Trentschin, he was overwhelmed by the Austrian general Heister, and afterwards steadily lost ground. In his absence a peace was concluded between Austria and the confederates at Szatmár, 1711. He lived some years in France and Spain, and afterwards with other refugees at the castle of Rodosto on the Sea of Marmora. He wrote in French a history of the struggle in Hungary, and several other works. His "Confessions et Aspirationes Principis Christiani" was published by the Hungarian Academy, 1876.

Rákóczy March, national air of Hungary and Transylvania, by an unknown composer, named in honor of Francis Rákóczy II. It has played a similar rôle in the history of Hungary to that played in the history of France by the "Marseillaise," the anthem of the French Revolution.

Râle (räl), rustling sounds heard in the lungs in various diseases. They are whistling, cooing, or wheezing in character when they are caused by spasm or narrowing of the bronchial tubes or small bronchioles; and crackling, bubbling, or gurgling in character when there is liquid exudation in the air-passages.

Rale, or **Rasles** (räl), **Sebastien**, 1658–1724; French missionary to the N. American Indians; b. Franche-Comté; was a Jesuit; went to Quebec, 1689, and was stationed successively at the Abenaki mission of St. Francis near the

falls of the Chaudière, then in the Illinois country, and finally at Norridgewock on the Kennebec. He arrived here at least as early as 1695. The English settlers accused him of instigating the forays of the savages on the settlements along the coast, and set a price on his head. In 1724 a party of 208 men from Fort Richmond surprised Norridgewock, killed several of the Indians, and shot Father Rale. His dictionary of the Abenaki language, preserved in the Harvard Library, was printed in the "Memoirs" of the American Academy of Arts and Sciences, 1833.

Raleigh, or **Ralegh** (rā'lĭ), **Sir Walter,** 1552–1618; English explorer and author; b. Hayes, Devon; fought as a volunteer for the Huguenots in France from 1569 to abt. 1575; served in army in the Netherlands, 1576–79; aided in suppressing the Earl of Desmond's rebellion in Ireland, 1580; associated with Sir William Morgan in the government of Munster; obtained the favor of Queen Elizabeth; and was employed in confidential negotiations with the French ambassador and the Duke of Anjou. He subscribed £2,000 to the second expedition to Newfoundland under Sir Humphrey Gilbert, which resulted in the occupation of that island; obtained from Elizabeth a new patent for discoveries and colonization, and sent an expedition, 1584, which explored Pamlico and Albemarle sounds. The newly discovered region was named Virginia by the queen, who conferred knighthood on Raleigh, 1585. He was made Lord Warden of the Stanaries and Seneschal of Cornwall and Devon; entered Parliament; dispatched to Virginia an expedition under Sir Richard Grenville, which made a settlement on Roanoke Island, the only practical result being the introduction of tobacco and potatoes into England. As member of council of war, lieutenant of the Cornwall forces, and, later, commander of a vessel, Raleigh aided in repelling the Spanish Armada. In 1590 he equipped a fleet with which Frobisher cruised successfully against Spanish vessels in the W. Indies; 1592, was imprisoned in the Tower for two months for his secret marriage with Elizabeth Throgmorton, one of the queen's maids of honor; debarred from court; organized an expedition, 1595, and explored the coasts of Guiana and ascended Orinoco River; published on his return "Discovery of the Large, Rich, and Beautiful Empire of Guiana." He served as rear admiral at the taking of Cadiz, 1596; was readmitted at court, 1597; sailed with the Earl of Essex to the Azores same year, and took Fayal; ambassador to the Netherlands, 1600; Governor of Jersey, 1601; accused of conspiracy to raise Lady Arabella Stuart to the throne and committed to the Tower, 1601; condemned to death, 1603; kept thirteen years in prison, during which time he wrote his principal work, "The History of the World." He recovered his liberty, though not his pardon, January 30, 1616; obtained from James a commission as admiral, and sailed with a fleet for the discovery of his promised El Dorado in Guiana, 1617; had several engagements with the Spaniards, and was foiled in his objects; on his return, June, 1618, was imprisoned on complaint of the Spanish ambassador, Gondomar, in consequence of his conduct in Guiana, and it having been decided by the judges that the sentence of death pronounced 1603 was still valid, he was executed October 29th.

Raleigh (rā'lĭ), capital of N. Carolina and of Wake Co.; 148 m. N. by W. of Wilmington; in cotton-, corn-, and tobacco-growing region; handles about 125,000 bales of cotton annually; contains large railway car works and repair shops, foundries, planing mills, cotton mills, hosiery mills, cigar factory, drug-manufactures, furniture factory, tobacco factory, cotton-seed oil mills, manufactures of steam engines, agricultural implements, ice, and other commodities. Public buildings include the capitol, in park of magnificent oaks; U. S. Govt. building, State Penitentiary, State Hospital for the Insane, State Agricultural and Mechanical College, State Fair Grounds, State Supreme Court and State Library, State Museum and Hall of History, State Arsenal, Soldiers' Home, Methodist and Roman Catholic orphanages, and state institutions for the white blind and the colored deaf-mutes and blind. Educational institutions include Shaw Univ., for colored students, with an agricultural and mechanical, law, medical, and pharmaceutical annex; Peace Institute (Presbyterian), Baptist Female Univ., St. Mary's School (Protestant Episcopal), Raleigh Male Academy (nonsectarian), St. Augustine's Normal School and College Institute (Protestant Episcopal), Latta Univ. (colored). The Olivia Raney Memorial Library is one of the finest in the South. Raleigh was laid out 1792, and named in honor of Sir Walter Raleigh. Pop. (1910) 19,218.

Ral'lidæ, family of birds including the rails and gallinules.

Ramadan'. See RAMAZAN.

Ra'mah, name of several places in Palestine, two of which are historically interesting and important. One, first mentioned in Joshua xviii, 25, and identified by Robinson 1838, is on the top of a high hill about 5 m. N. of Jerusalem; belonged to the tribe of Benjamin. The other, where Samuel was born (1 Sam. i, 1), has not yet been identified with certainty.

Rama'yana, the older of the two great Sanskrit epics (the other being Mahabharata) ascribed to the poet Valmiki, and dating probably from the fifth century B.C. The hero is Rama, an incarnation of Vishnu, as the son of the King of Oudh. It relates his marriage with Sita, their wanderings in the forest, the seizure of Sita by the giants of Ceyton, her recovery, and the restoration of Rama to the throne of his ancestors. It contains 24,000 verses, and is divided into seven books.

Ramazan', Mussulman fast; incumbent on every adult believer unless specially exempt; continues through entire month of Ramazan, the ninth of the Mohammedan year, because in that month the Koran was revealed to the

Prophet. No food or drink of any sort must enter the mouth from dawn until sunset. One must neither smoke nor inhale perfumes, and must carefully abstain from swallowing his saliva. The Mussulman calendar being lunar, Ramazan in the space of thirty-three years traverses all the seasons. It is terminated by the festival of the Kutchuk or Little Bairam, a period of rejoicing.

Rambouillet (răn-bō-yā'), **Catherine de Vivonne** (Marchioness de), 1588–1665; French leader of society; b. Rome; daughter of Jean de Vivonne, Marquis of Pisani, French ambassador in Rome, and a Roman lady; at early age married Charles d'Angennes, afterwards Marquis de Rambouillet. In Paris she was shocked by the immorality and puerility of the court circles, and became celebrated for her literary reunions at the Hôtel Rambouillet, kept up for half a century. Her daughter Julie, afterwards Duchess de Montausier, was the idol of her guests. The women were called *les précieuses*, and assumed classical and romantic names.

Rameau (rä-mō'), **Jean Philippe**, 1683–1764; French composer; b. Dijon; was violinist in the orchestra of a troupe of strolling actors, 1701–17; organist successively at Lille, Clermont, and Paris; published "Treatise on Harmony," "New System of Theoretic Music," etc.; composed about twenty operas and ballets, including "Castor and Pollux," considered his masterpiece, and "Hippolytus and Aricina."

Ramenghi (rä-měng'gē), **Bartolomeo** (commonly called BAGNACAVALLO), 1484–1542; Italian painter; b. near Ravenna; pupil of Raphael; chief remaining works in Bologna; include a "Christ on the Cross," in St. Petronio, several frescoes in other churches, and "Holy Family," in the Pinacoteca.

Ram'eses. See RAMSES.

RAMIE.

Ram'ie, Rhe'a, or **Chi'na Grass,** fiber of *Bochmerea nivea*, an Asiatic plant of the nettle family; is stronger than hemp and more durable when woven than linen. The beautiful fabric called China grass cloth is made from ramie. The cultivation of ramie has been tried in the S. U. S. with success, the product being superior in quality even to that of Java. It is propagated by seeds. It can be harvested three times a year, yielding in all some 1,500 lb. of fully prepared ramie per acre. It is perennial, requires little labor and attention, has few insect enemies, and stands a rainy season or a drought with little injury. The fiber makes good paper, and seems destined to become an important commercial product. There is one native species in the U. S. Ramie, being practically unknown to the public, has been much used to adulterate silks, etc.

Ram'mohun Roy, abt. 1774–1833; Indian scholar; b. Burdwan, Bengal; belonged to a wealthy Brahmanical family; edited *The Bengal Herald* in English; was, 1830, sent to the British court from the sovereign of Delhi; early renounced the Brahmanical faith. Much attention was attracted, 1820, to his "Precepts of Jesus, the Guide of Peace and Happiness," written from a Unitarian standpoint. He founded the Brahmo Somaj.

Ra'moth Gil'ead, first mentioned in Deuteronomy iv, 43; a Levitical city and one of the three cities of refuge on the E. side of the Jordan; commonly identified with Es-Salt, about 23 m. NE. of Jericho. It seems better, however, to identify it with Jalud, the equivalent of Gilead. It lies about 5 m. N. of Es-Salt.

Ram'part. See FORTIFICATION.

Ram'pur, capital of native state of same name, India; 40 m. NW. of Bareilly; noted for its manufactures of fine shawls, damasks, and pottery. Pop. (1901) 78,758.

Ramsay (răm'zĭ), **Allan,** 1686–1758; Scottish poet; b. Leadhills, Lanark; successively wigmaker, bookseller, printer of poems, usually on "broadsides" or single sheets, and publisher in Edinburgh; started the first circulating library in Scotland; writings include "The Vision," a Jacobite allegory; "The Gentle Shepherd, a Scots Pastoral Comedy," "The Tea-table Miscellany," "Collection of Thirty Fables," "The Evergreen," a collection of old Scotch songs.

Ramsay, Allan, 1713–84; Scottish portrait painter; b. Edinburgh; son of preceding; studied in Rome; settled in London; became principal painter to George III, 1767, and was at one time considered (without reason) a rival of Sir Joshua Reynolds.

Ramsay, Sir Andrew Crombie, 1814–91; Scottish geologist; b. Glasgow; Prof. of Geology at University College, London, 1848; lecturer at Royal School of Mines, 1851; president of Geological Society of London, 1862–63, and British Association for Advancement of Science, 1880; became director-general of the Geological Survey, 1872; knighted, 1881; author of numerous memoirs, works on the geology of Arran, N. Wales, and Switzerland; of

"Physical Geology and Geography of Great Britain," and of a large "Geological Map of England and Wales."

Ramsay, David, 1749–1815; American historian; b. Lancaster Co., Pa.; settled as physician at Charleston, S. C., 1773; field surgeon in Revolutionary War; member of legislature, 1776–83; of Charleston Council of Safety; prisoner of war at St. Augustine, 1780–81; member of Continental Congress, 1782–84, 1785–86; acting president during most of the latter period; later president of S. Carolina Senate; author of "History of South Carolina," "History of the American Revolution," "History of the Revolution in South Carolina," "History of the United States," "Universal History Americanized," etc.

Rams'den, Jesse, 1735–1800; English mathematical instrument maker; b. Salterhabble, near Halifax; married the daughter of John Dollond, and received as her dowry a share in Dollond's patent for achromatic telescopes; improved the sextant, theodolite, equatorial barometer, and other instruments; invented a dividing machine; made the theodolite for the Ordnance Survey of England; devised the mural circle; made telescopes for the observatories of Dublin, Paris, Blenheim, and Gotha; elected Fellow of the Royal Society, 1786; received the Copley medal, 1795.

Ram'ses, or **Rameses** (Egyptian, RA-MESSU), name of thirteen kings of Egypt belonging to the nineteenth and twentieth dynasties. The most important follow: RAMSES II, son of Seti I; was associated with his father at an early age; ruled about sixty-seven years; resided chiefly at Tanis; erected temples and fortresses throughout Egypt and Nubia and in foreign lands; at Abydos completed the Memnonium; at Thebes built the Ramesseum; conquered the Hittites and their allies; captured Ascalon and other cities of Palestine; took to wife the daughter of Chetasar, the Hittite king, after forming an offensive and defensive alliance; was succeeded by his son Meneptah. RAMSES III (called by Herodotus RHAMPSINITUS), second king of the twentieth dynasty; reigned at least fifty-five years; waged war with the Libyans and with his neighbors to the NE., the Hittites and their allies, while Punt and Ethiopia were forced to pay tribute; embellished various cities of Egypt; was succeeded by ten others bearing the same name.

Ramses, or **Raameses,** name given in Exodus i, 11 to one of the "store cities" built by the Israelites for the Pharaoh of the Oppression, who usually has been identified with the great Ramses II of the nineteenth dynasty. Its location is unknown, but it was probably a frontier town like Pithom.

Ra'mus, Petrus (French, PIERRE DE LA RAMÉE), 1515–72; French humanist and mathematician; b. Cuth, Sommer; studied under great difficulties at Univ. of Paris; published, 1543, two works, in which he with great boldness attacked Aristotle and the scholastic method of philosophizing. The books were condemned and the author forbidden to teach, but by favor of the king he was appointed to the university, 1551; other works, "Geometria" and "Scholæ Mathematicæ." In 1561 he embraced Protestantism, and was killed in the massacre of St. Bartholomew.

Rancé (räṅ-sā'), **Dominique Armand Jean Lebouthillier de,** 1626–1700; founder of Order of Trappists; b. Paris; ordained 1651, but led a dissipated life until 1660, when he gave all his property to the poor, renounced his benefices, and retired to the monastery of La Trappe, of which he became abbot, 1663. He introduced rules of the severest asceticism and founded what was practically a new order.

Ran'dall, Samuel Jackson, 1828–90; American statesman; b. Philadelphia, Pa.; engaged in mercantile business; entered political life at early age; member of city council for several years; state senator, 1858–59; Democratic member of Congress from 1862 till death; for many years chairman of the Committee on Appropriations and member of the Committee on Rules; 1876, 1877, and 1879, Speaker; widely known as a political debater and as a parliamentarian.

Ran'dolph, Edmund Jennings, 1753–1813; American statesman; b. Williamsburg, Va.; son of John and nephew of Peyton Randolph; delegate to the Virginia Convention, May, 1776; member of Continental Congress, 1779–83, and of the Constitutional Convention, 1787; refused to sign the Constitution, but afterwards advocated its adoption. In 1788 he was Governor of Virginia; appointed first U. S. Attorney-general, 1789; became U. S. Secretary of State, January, 1794, but, being accused of an intrigue with the French envoy, resigned August, 1795, and published "A Vindication."

Randolph, John (of ROANOKE), 1773–1833; American statesman; b. Cawsons, Va.; Democratic member of Congress, 1799–1825, excepting two terms; chairman of Committee of Ways and Means, 1801; prominent champion of state rights, and as partisan of Jefferson's administration till 1806, when he separated from his political associates, opposed the election of Madison, the embargo, and the war with England, 1812, in consequence of which he was defeated in that year in his candidacy for reëlection, but was returned 1814; opposed the Missouri Compromise with vehemence, fastening on its N. supporters the epithet "doughfaces"; in U. S. Senate, 1825–27; fought duel with Henry Clay, 1826, growing out of his denunciation of the political alliance between the latter and J. Q. Adams; in convention of 1829 for revising the constitution of Virginia; went as minister to Russia, 1830, but spent most of his time in London; returned 1831; again elected to Congress, 1832, but died before taking his seat.

Randolph, Peyton, 1723–75; American statesman; b. Williamsburg, Va.; son of Sir John Randolph; studied law in London; royal Attorney-general for Virginia, 1748–66; elected to House of Burgesses; chairman of committee

to revise the laws of Virginia; framed the remonstrance of the Burgesses to the king against the passage of the Stamp Act, 1764, but after its passage discountenanced Patrick Henry's celebrated "five resolutions," 1765; Speaker House of Burgesses for several years; chairman of the vigilance committee chosen March 10, 1773; president of Virginia Convention at Williamsburg, August, 1774; first president of Continental Congress on its meeting at Carpenters' Hall, Philadelphia, September 5, 1774; president of second Virginia convention, Richmond, March 20, 1775; again chosen president of Continental Congress, May 10, 1775, but resigned May 24th, returning to Virginia to preside over House of Burgesses; resumed seat in Congress a few months later.

Rand, The, or **Witwatersrand** (vĭt-wä'tĕrs-rănd), mountainous tract in the Transvaal, S. Africa, celebrated for its gold mines, which began to be worked 1885; extends for about 25 m. on either side of Johannesburg, the mining center; reefs are over a mile deep and conditions favor deep mining. Just before the Boer War the district yielded at the rate of $100,000,000 a year; value of product in March, 1912 (the record month), $17,150,000.

Range Find'ers and **Posi'tion Finders,** instruments used in the military and naval service for quickly determining the position of the target or object to be fired at with respect to the gun. A *range finder* determines the distance, or range, to the target, but does not give the direction. A *position finder* measures both the distance of the object to be fired at, in yards, and its direction, in degrees and minutes, the meridian line passing through the axis of the gun being taken as the origin of direction. Range finders are used with infantry, cavalry, and field artillery, while the position finder is used exclusively with seacoast fortifications where the location of the guns is permanent.

Range finders may be classed under three general heads: (1) Acoustic range finders, (2) stadias, and (3) topographical range finders. Acoustic range finders measure the time which elapses between the observed flash of a gun and the hearing of the sound of discharge. Knowing the rate at which sound travels, the range is easily determined by a simple operation in multiplication. A stop watch can be used for the purpose. The stadia is an instrument which determines the distance to an object by measuring the angle subtended by a known height at a known distance. The approximate height of a soldier is estimated, and forms the base of a triangle the apex of which is at the eye of the observer. The subtended angle is measured, and a sufficient number of the other parts of the triangle are known to compute the distance approximately. Specially prepared tables are used in connection with this instrument, which is of little practical value, as the exact height of the object observed cannot be known.

Nine tenths of all the range finders now used are topographical range finders, all differing but slightly in construction and principle. All depend upon the geometrical solution of a plane triangle, measured by trigonometry. There are three types of instruments—those requiring a short, fixed base; those similar to a theodolite, and those of the nature of a sextant. Those of the first type find the distance by the amount of displacement of the object as seen from either end of a short, fixed base line within the instrument itself. In the second class two telescopes are used on separate tripods, and are placed some distance apart. The telescopes measure the angle subtended at the object by the distance between the telescopes, and the ranges are found from a special calculating disk. Range finders of the third class all use a base line of some considerable length, and require observers at both ends of the line, working in conjunction. All these instruments are subject to certain errors of observation.

Since the natural target of the coast-artillery gunner is an enemy's vessel, generally in motion, the element of time becomes an important factor. The position finder is therefore the basis upon which every system of modern artillery-fire control depends. Two classes of such instruments are now in general use, the essential difference being the length and position of the working base line and in the number of stations and observers necessary. The first class, known as the *horizontal-base* position finders, are used where the fortification site is low and the water approaches are such that the enemy can be seen simultaneously by the two observers at the opposite extremities of a base line of considerable length. The second class are called *vertical-base* or *depression* position finders from the fact that the working base is vertical, being the height of the axis at the telescope above the level of the sea, and the angles through which the telescope is moved in following the target are all angles of depression. Instruments of this class are so much simpler in construction and operation, and possess advantages in that they are used in all cases where the fortification and its surroundings afford sufficient altitude for their installation. See ARTILLERY; GUNNERY.

Rangoon (răn-gŏn'), chief city of Burma and third port in importance in British India; on E. arm of the Irawadi delta, 20 m. from its mouth; is accessible for large craft; center of a system of canals and terminus of two railways; is badly built with houses often on bamboo piles, and narrow streets intersected by canals; principal exports rice, teak, cotton, spices, and skins. Near by is the Shway-Dagon Pagoda, a massive and imposing structure, containing a bell weighing 30 tons. The pagoda is the repository of eight hairs from the head of Gautama Buddha, and is a favorite object of pilgrimage and seat of an annual fair. Rangoon was 1753 selected by Alompra as capital of Pegu, and given its present name Ran-kun, or "end of the war." Before that it was named after the pagoda. The city was occupied by the British 1821, but soon returned to the Burmese; again taken 1852; since held by the British. Pop. (1910) 289,432.

Ran'idæ. See FROG.

Rank, grade of various officers in the army and navy. In the U. S., in order to facilitate official intercourse between officers of the two services, a correspondence in the several ranks was established by law; thus, the general of the army was made equal in rank with the admiral of the navy; lieutenant general with vice admiral; major general with rear admirals; brigadier generals with commodores; colonels with captains, etc. When the army rank of general and the naval ranks of vice admiral and commodore were abolished, the number of rear admirals was enlarged to eighteen, and these officers were divided into two classes, the first nine ranking with major generals and the second nine with brigadier generals. Chiefs of naval bureaus, no matter what their lineal rank may be, rank as rear admirals while holding the appointment and resume their lineal rank on its expiration. When the U. S. entered the World War the grade of various officers in the army and navy was radically changed by advancement, in order that American officers might occupy the same relative rank as the foreign officers with whom they were certain to be associated. On the complete demobilization of the U. S. armed forces, the question of future official rank will be taken up by the proper authorities.

Ranke (răn'kė), **Leopold von,** 1795–1886; German historian; b. Wiehe, Thuringia; became teacher at gymnasium of Frankfort-on-the-Oder, 1818, and Prof. of History at Univ. of Berlin, 1825; works include "History of the Romanic and Teutonic Peoples, 1494–1535," "Princes and Peoples of Southern Europe in the Sixteenth and Seventeenth Centuries," "The Servian Revolution," "The Conspiracy against Venice in 1688," "The Popes of Rome, their Church and State," "Germany in the Time of the Reformation," "Memoirs of the House of Brandenburg and History of Prussia during the Seventeenth and Eighteenth Centuries," "French History, Especially in the Sixteenth and Seventeenth Centuries," "History of England, Principally in the Seventeenth Century," "Universal History."

Rankine (răn'kĭn), **William John Macquorn,** 1820–72; Scottish physicist and engineer; b. Edinburgh; was Prof. of Civil Engineering in Univ. of Glasgow; published "Manual of Applied Mechanics," "Manual of the Steam Engine and other Prime Movers," "Civil Engineering," "Useful Rules and Tables," "Cyclopedia of Machine and Hand Tools," "Manual of Machinery and Millwork," "On a General Law of the Transformation of Energy and Outlines of the Science of Energetics," etc. One of the most noticeable of his physico-mathematical researches was based on an hypothesis of "molecular vortices," by which was deduced the laws of elasticity, and of heat as connected therewith.

Ranun'culus, genus of plants of the *Crowfoot* (*q.v.*) family. The flowers, which are mostly yellow, have five sepals, five petals, many stamens, and many separate flattened pistils each with a solitary erect seed. About 200 species are known, widely distributed in all parts of the world, and of these more than one fourth occur in N. America. *Ranunculus aconitifolius* and *R. asiaticus* are the ranunculi of gardens.

RANUNCULUS ASIATICUS.

Ranz des Vaches (răns dā văsh), name of the melodies which Swiss herdsmen play on their alp horns.

Rape, violation or carnal knowledge of a woman, forcibly and against her will. Every civilized nation has declared its abhorrence of this offense, and affixed to its commission the severest punishments. By the civil law rape was punishable with death and confiscation of goods. By the Saxons it was esteemed a felony and punished with death, and it was long a capital offense in England, but is now punishable by imprisonment with hard labor for not less than two years. In the U. S., although the punishment varies in different states, it is by all treated as felony and punished with imprisonment for life or for a term of years. In some states it is a capital offense.

Rape (*Brassica napus*), a plant of the mustard family related to the Swedish turnip and colza; largely raised in Europe for the oil of its seeds. Its stalks are valuable forage, and are good to plow under for manure. Its oil cake is used as sheep food and as a fertilizer. The oil is used for machinery, for lighthouse lamps, etc., and the seed is fed to cage birds.

Raphael (răf'ā-ĕl) (Italian, RAFFAELLE), **Sanzio** (sän'zē-ō), or **Santi d'Urbino** (sän'tē dōr-bē'nō), 1483–1520; Italian painter; b. Urbino; studied under his father, Giovanni Santi and under Perugino, whose studio at Perugia he entered abt. 1498, and whose influence is visible in Raphael's "Sposalizio" ("Marriage of the Virgin"), painted, 1504, and now in the Brera at Milan. After a short residence in Florence, Raphael returned to Perugia, where he painted, 1507, "The Entombment," now in the Borghese Gallery, Rome. In 1508 he was called to Rome by Julius II, and in the hall of the Segnatura in the Vatican painted "The Dispute on the Sacrament" and "The School of Athens," besides adorning the vault with allegorical figures. He made the designs for the remaining rooms in the Vatican, and painted the most important parts. In the course of twelve years he finished other noteworthy pictures, including the Madonnas "di Foligno," "del Pesce," "della Sedia," "di S. Sisto" (now in Dresden), "di Loreto," and "La Perla"; the "Santa Cecilia," "Lo Spasimo," the "Transfiguration," the frescoes of the Sibyls in Santa Marta della Pace, the Psyche frescoes, and the "Galatea," the cartoons for the Sistine tapestries (now in the

S. Kensington Museum, London), besides many subjects for engraving. Raphael was also distinguished as a portrait painter. He succeeded Bramante as the chief architect of St. Peter's. His countrymen called him Il Divino, "the divine."

Raphides'. See RHAPHIDES.

Rapidan' Riv'er, stream of Virginia which rises by several head streams at the base of the Blue Ridge, and flows between Green and Orange cos. on its right and Madison and Culpeper on its left. Ten miles above Fredericksburg it joins the Rappahannock, after a course of about 80 m.

Rap'id-fire Guns. See MACHINE AND RAPID-FIRE GUNS.

Rapp, George, 1770–1847; founder of the sect of Harmonists; b. Iptingen, Würtemberg, Germany; founded in early manhood a communistic religious association; came into conflict with the authorities; emigrated to the U. S., 1803, with a number of his associates; founded the town of Harmony, Butler Co., Pa., and later Economy, now Harmony, Beaver Co.

Rappahan'nock Riv'er, stream which rises in the foothills of the Blue Ridge, near the NW. border of Fauquier Co., Va., and flows SE., generally parallel to the Potomac, reaching Chesapeake Bay through a broad estuary. Its largest branch is the Rapidan. Below Fredericksburg it is a noble tidal stream; length, 250 m.

Rapto'res, group, or order, of birds containing the birds of prey, comprising the hawks, owls, secretary bird, and American vultures. These last differ from the others in many important particulars. The raptores are birds of powerful flight, characterized by a hooked, cered beak, and, with few exceptions, powerful feet and sharp, curved claws. There are about 500 species, distributed throughout the world. Accipitres is by many authors restricted to the hawks or diurnal birds of prey.

Raschid (răsh'ĭd). See HAROUN AL RASCHID.

Rash, popular name for the acute exanthematous or eruptive diseases, or more frequently for the eruption itself which attends such diseases. Nettle rash or urticaria, scarlet rash (roseola), and canker rash (scarlet fever) are the diseases generally called by this name, which, though convenient for nursery use, is of no scientific value.

Ra'shi. See SOLOMON BEN ISAAC.

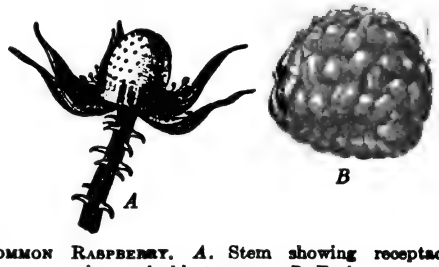
Rask, Rasmus Kristian, 1787–1832; Danish scholar; b. Brændekilde, Fünen; traveled and studied in Iceland, Russia, Sweden, Persia, and India; works include "Researches Concerning the Origin of the Icelandic Language," "Introduction to the Study of the Icelandic Language," grammars of the Anglo-Saxon, Spanish, Frisian, and Italian languages, "Introduction to a Scientific Orthography of the Danish Language."

Raskol'niks, Russian sectarians; members of the *Raskol,* or schism, which dates officially from 1666, and was caused by reforms introduced by Nikon, patriarch of the Russian Church. The Raskolniks objected to the alterations in and the printing of the Church books, to the form of the cross, etc., and took the name of *Starvotryadtsy,* or Old Ritualists; also calling themselves *Starovertsy,* or Old Believers. Several czars adopted severe measures against them; their loyalty during the Polish insurrection of 1863 gained them large concessions. Until 1771 they had no legalized establishments. They belong almost exclusively to Great Russia; have colonized in Poland, Livonia, and Little and White Russia; comprise two great bodies—the *Popovtsy,* or priestly, and *Bezpopovtsy,* or priestless, and the *Dukhovnyie Khristiane* (spiritualistic Christians), who are divided into a number of sects, among whom are the *Stundists,* the *Dukhobortsy,* or spirit wrestlers, and the *Skoptsy,* or self mutilators, gloomy fanatics. The numbers of the Raskolniks are estimated at from 1,000,000 to 12,000,000.

Raso'res, former group of birds containing originally the fowls and pigeons, and later the fowls alone. See GALLINÆ.

Rasp. See FILE.

Rasp'berry, name applied to those species of the rosaceous genus *Rubus* in which the "fruit," or collection of drupelets, falls away in a thimblelike mass from the receptacle, leaving the latter on the bush. In the U. S., up to about the middle of the nineteenth century, the cultivated varieties belonged to the European species, *R. idæus,* but very nearly all

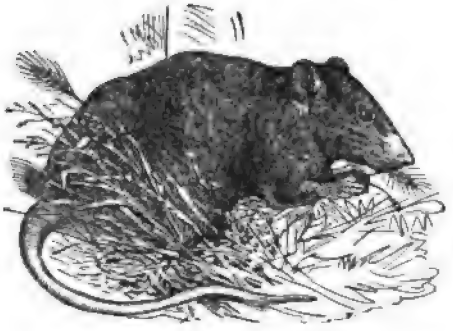


COMMON RASPBERRY. *A.* Stem showing receptacle calyx and old stamens. *B.* Fruit.

the varieties now grown are offsprings of native species, *R. strigosus,* the wild red, and *R. occidentalis,* the wild black or black cap. The commonest pure form of the former in cultivation is the Culbert. The black species is represented by Gregg, Ohio, and many others. An intermediate class, hybrids between the two, has become prominent, and it now comprises some of the best varieties, of which Shaffer may be taken as a type. This class has been described as a distinct species under the name of *R. neglectus. R. strigosus* is the American representative of the *R. idæus,* with which it is very closely allied. The cultivation of the European varieties is attended with difficulty in the N. parts of the U. S., chiefly because of the severity of the winters. Another species of raspberry, *R. phœnicolasius,* has been introduced from Japan.

Rastatt, or Rastadt (räs'tät), fortified town of Baden; on the Murg; 14 m. SW. of Carlsruhe. A congress met here in November, 1713, and a treaty of peace was signed March 6, 1714, ending the Spanish War of Succession. The second congress of Rastatt opened December 9, 1797, and granted the extravagant demands of the French; but it broke up April, 1799, on the war being renewed, and the French ambassadors on leaving were murdered by Austrian hussars, April 28th. The Baden revolution of 1849 began here May 11th. Rastatt was bombarded by the Prussians July 6th and 7th, and surrendered July 23d. The Prussians afterwards occupied it till 1866. Pop. (1905) 14,403.

Rat, any one of the larger species of the family *Muridæ*, the smallest being known as mice. The best known of these are the common brown rat (*Mus decumanus*) and the black rat (*M. rattus*). The common rat was originally a native of India and Persia. It is generally believed that it extended into Europe about the middle of the eighteenth century, and found its way to America about 1775. It



Black Rat.

was anticipated in its incursions by the black rat, but its superior strength and aggressiveness have supplanted that species in almost all countries. It is very prolific, breeding four or five times a year and having about a dozen young each time. The black rat (*M. rattus*) also was originally peculiar to Asia. With prefixes or qualifying terms the name rat is applied to various other species of *Muridæ* and to rodents of other families, such as the gopher and kangaroo rat. Rats are agents in the spread of disease, particularly the bubonic plague. See Rodentia.

Ratafi'a, name given to a large class of liqueurs, or sweet alcoholic drinks strongly flavored with aromatics.

Ra'tel, any one of three carnivorous mammals of the family *Mustelidæ* and genus *Mellivora*, found in Africa and India, known as honey badgers. The typical species, *M. ratel* or *Capensis*, of S. Africa, has a stout, badger-like body and short tail; its total length is about 3 ft.

Ratio (rā'shĭ-ō), numerical measure of the relation which one quantity bears to another of the same kind. The only way in which two quantities can be compared is by division. The operation of dividing one quantity by another of the same kind consists in dividing *the number of times* any assumed unit is contained in the former by *the number of times* the same unit is contained in the latter. The operation of finding a ratio is therefore purely numerical, and the resultant ratio is consequently an abstract number. If the terms of the ratio are commensurable, their ratio is *exact*; if the terms are incommensurable, the expression of their ratio by quotient of two abstract numbers is only *approximate*; but it is to be remarked that the approximation to the true value may be made to any desirable degree of exactness. See Proportion.

Ra'tionalism, tendency in modern thought which claims for the unaided human reason the right of deciding in matters of faith. It requires certainty as the condition of its favor, and rejects what does not come before it with the exactness and clearness of a mathematical demonstration. The term was first used in its present sense by Kant. Rationalism has exerted its chief sway in Germany. The sources were various, not only embracing different countries, but likewise different departments of investigation. The deism of England, one of the most polished and powerful of all forms of free thought, was industriously propagated in Germany, where the works of Lord Herbert, Hobbes, Shaftesbury, and others were circulated in the language of the people and read by wide circles. In Holland the philosophy of Descartes and Spinoza was very powerful, and its influence spread E. of the Rhine.

France, however, was the chief foreign country which contributed to the rise and sway of German rationalism. The influence of Voltaire and the Encyclopedists was great, and Berlin became as much a home to these men as Paris had ever been. Rationalism was in the ascendant in Germany, 1750–1800, but with the beginning of the new century it began to lose its hold. In 1835 a new impulse was given to rationalistic criticism by Strauss's "Life of Jesus," which advocated the mythical origin of the gospels. The most recent phase of rationalistic thought is materialistic.

Rat'isbon (German, Regensburg; ancient, *Reginum*), town of Bavaria; on the Danube, opposite the influx of the Regen; 67 m. NNE. of Munich; is surrounded with walls, and has a Gothic cathedral, begun 1275; town house, in which the Imperial Diet assembled 1662–1806; a magnificent stone bridge over the Danube, connecting the town with the suburb of Stadt-am-Hof. Gold, silver, brass, iron, steel, earthen and porcelain ware, leather, tobacco, and glass are manufactured, and there is an active trade in wheat and salt. Originally a Celtic town, it was made a frontier fortress by the Romans; became a free imperial city, 1245; stormed by both the French and the Austrians, 1809; ceded to Bavaria, 1810. Pop. (1906) 48,820.

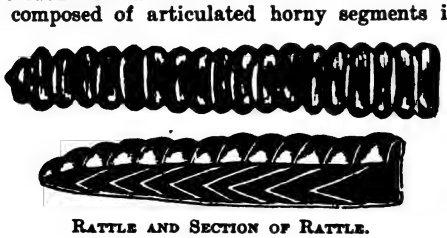
Rati'tæ, order or suborder of birds, containing the ostriches, cassowaries, and kiwis. ' The

group embraces the largest of birds, all of which are incapable of flight, and progress by running. The species, though comparatively few, represent several well-defined families, *viz.*, *Struthionidæ*, embracing the African ostriches; *Rheidæ*, including the American ostriches, or nandus; *Casuaridæ*, with the cassowaries and emus of the Papuan Archipelago, Australia, etc.; and *Apterygidæ*, including the kiwis of New Zealand; the order was also well represented in former geological epochs, especially in New Zealand, by the gigantic *Dinornithidæ*, which seem to have been destitute of true wings.

Rattan', slender stem of various plants of the genus *Calamus*, many of which are climbers or trailers, others quite short, all having a beautiful head of feathery leaves. *C. viminalis*, *C. rudentum*, *C. rotang*, *C. versus*, *C. scipionum*, and *C. draco* are among the species. The third and the last mentioned yield a part of the dragon's blood of commerce. Some produce good fruits; but the chief use is that of the stalks. From Borneo to Bengal great quantities are gathered for the markets. In China mats, sails, and cables are among the articles made from them. In the U. S. they are used in making chairs, baskets, canes, umbrella ribs, etc., and splinters of rattan are used in carriage trimming and other ornamental work. Tropical America has numerous rattanlike palms of the genus *Desmoncus*. They are locally used like the true rattans. See CANE.

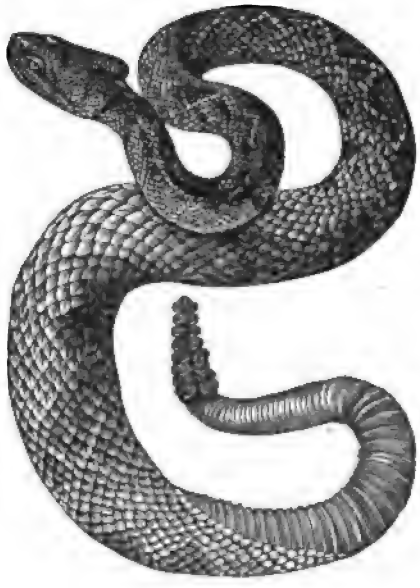
Rattazzi (rät-tät'sē), **Urbano**, 1808–73; Italian statesman; b. Alessandria; began to practice as an advocate at Casale; elected to the Sardinian Parliament, 1848; opposed the Austrian authority in Italy; member of the cabinet of Gioberti, 1849; in cabinet of Cavour, 1853–58 as Minister of Justice, but resigned on account of opposition to Cavour's policy of alliance with France; formed a cabinet in opposition to Ricasoli, 1862, and again, 1867, but held the place only for a few months. His wife, MARIE STUDOLMINE DE SOLMS, 1830–1902; b. London, England; daughter of the Princess Lætitia Bonaparte; married Rattazzi, 1863, and M. de Rute, 1877; wrote a biography of Rattazzi and other works.

Rat'tlesnake, snake of the family *Crotalidæ* provided with a rattle to the tail. The rattle is composed of articulated horny segments in



RATTLE AND SECTION OF RATTLE.

varying number—from two or three up to thirty or more. The popular belief that the number of segments indicates the age of the animal is erroneous. The species of the group are peculiar to America, and are especially numerous in the arid regions of the SW. parts of the U. S. According to Professor Cope, eighteen species and a number of subspecies are found within the limits of the U. S.; of these fifteen belong to the genus *Crotalus*, which has the head covered with small scales.



RATTLESNAKE.

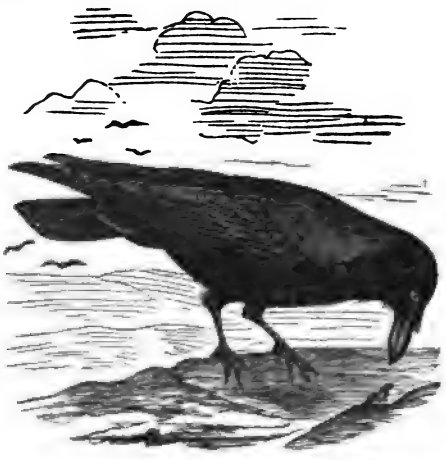
The common rattlesnake of the E. states is *C. horridus*; in the S. states, from N. Carolina to Florida, *C. adamanteus* is also found. A species of *Crotalophorus* (*C. catenatus*) is also found in the W. states, and extends as far E. as W. New York. The venom of the rattlesnake is most to be feared in warm weather.

Rauch (rowch), **Christian Daniel**, 1777–1857; German sculptor; b. Arolsen; became famous, 1813, by his statue of Queen Louisa, who had enabled him to study in Dresden and Rome; later executed hundreds of works, including the colossal equestrian statue of Frederick the Great at Berlin. He was court sculptor and professor in the Academy of Berlin.

Ravaillac (rä-väl-yäk'), **François**, abt. 1578–1610; French regicide; b. near Angoulême; was successively a lawyer's clerk and schoolmaster at Angoulême, and was imprisoned for some offense. His hatred of the Protestants, and of Henry IV as the arch enemy of the Catholic faith, became a monomania. He went to Paris, and, May 14, 1610, stabbed the king to the heart while his carriage was detained in a narrow street. He was tried by the Parliament of Paris, and torn to pieces by horses, with unexampled tortures.

Ra'ven, bird (*Corvus coraæ*) which differs from the crow chiefly by its larger size and the lance-shaped feathers of its chin and throat. It is found over the greater part of the N. division of the Old World, as well as N. America,

although it is rare on the Atlantic seaboard. It generally associates in pairs; builds a rude nest, usually on a cliff, and deposits therein



RAVEN.

from four to six eggs; capable to some extent of mimicking the human voice; was formerly, and is still by some persons, looked on as a bird of evil omen.

Raven'na, city in province of same name, Italy; between the Lamone and Ronco; connected with the great towns of the peninsula by rail and with the Adriatic by canal, completed 1747; stands in a marshy plain over 4 m. from the water, though anciently it was bathed by the Adriatic, and has walls 3 m. in circumference. Ravenna is, according to tradition, older than Rome. The Romans subdued it, 187 B.C., and Augustus made it the headquarters of the Roman fleet on the Adriatic, connecting it with the Po by an inland canal. Honorius (404) made Ravenna the capital of the W. empire. Until 679 its archbishop claimed equality with the pope. Taken by Odoacer, king of the Heruli, 476, it was captured from him later, after a three years' siege, by the Ostrogoth Theodoric the Great, 493. Belisarius took it, 538. Narses, another general of Justinian, made it the capital of the exarchate of Ravenna, and it was governed by the emperors of Constantinople till 752. Then the last exarch was expelled by Atolph, King of the Lombards; himself expelled, 755, by Pepin of France, who bestowed the city on the popes. It became an independent dukedom, 1318; was seized by Venice, 1440. Pope Julius II regained it, 1509. It continued part of the states of the Church, with the exception of intervals during 1797–1815, till incorporated in the Kingdom of Italy, 1860. Pop. (1901) 64,031.

Rawal Pindi (rä'wäl pĭn'dē), capital of division and district of same name in the Punjab, British India; between the Indus and Jhelum; 160 m. NW. of Lahore; is a fortified military post; has large trade with Afghanistan and Kashmir; was the scene of the surrender of the Sikhs after their defeat at Gujrat, 1849, and of a great durbar held by the Viceroy of India in honor of the Amir of Afghanistan, 1885. Pop. (1901) 87,688.

Raw'don-Hast'ings, Francis (Marquis of Hastings), 1754–1826; British military officer and statesman; b. Ireland; entered the army, 1771; served at Bunker Hill, the battles of Long Island and White Plains, and the attacks on forts Washington and Clinton; raised in New York a corps called the Volunteers of Ireland, which he commanded; distinguished himself at Monmouth; as general was prominent at the battle of Camden, S. C.; defeated Gen. Greene at Hobkirk's Hill, 1781; relieved Fort Ninety-six; succeeded his father as Earl of Moira, 1793; made Lord Lieutenant of Ireland, 1805; Governor General of India, 1813–23; created Marquis of Hastings, 1816; Governor of Malta, 1824–26.

Raw'lins, John Aaron, 1831–69; American army officer; began law practice in Galena, 1855; became a leading Democrat of the Douglas school; on Grant's appointment to the army, 1861, was made assistant adjutant general on his staff; served thereon through the war; became chief of staff and brigadier general, U. S. army, when Grant was made lieutenant general; brevet major general; Secretary of War, 1868–69.

Raw'linson, George, 1815–1902; English historian; b. Chadlington, Oxford; brother of Sir Henry Creswicke Rawlinson; became fellow of Exeter College, 1840; Hampton lecturer, 1859; Camden Prof. of Ancient History at Oxford, 1861; canon of Canterbury Cathedral, 1872–89; author of "The Five Great Monarchs of the Ancient Eastern World," "A Manual of Ancient History," "The Sixth Great Oriental Monarchy; or, The Geography, History, and Antiquities of Parthia"; "The Seventh Great Oriental Monarchy; or, The Geography, History, and Antiquities of the Sassanian or New Persian Empire"; "History of Ancient Egypt," "Egypt and Babylon," and a "History of Phœnicia."

Rawlinson, Sir Henry Creswicke, 1810–95; English Orientalist and diplomatist; b. Chadlington, Oxford; entered the Bombay army, 1826; political agent to Kandahar and Turkish Arabia, 1840–43; consul general at Bagdad, 1865–68; member of the Council of India, 1858–59; envoy to Persia, 1859–60; president of Royal Geographical Society, 1871–73, 1875–76, and of the Society of Biblical Archæology after 1873; received a baronetcy, 1891. He translated the celebrated rock inscription of Beristun; edited, with E. Norris and George Smith, five volumes of cuneiform inscriptions; published "England and Russia in the East," etc.

Ray, or Wray, John, 1627–1705; English biologist; b. Black Notley, Essex; took orders in the Church of England, but refused to subscribe to the Act of Uniformity, 1662; traveled on the Continent with Francis Willoughby; became a fellow of the Royal Society, 1667; published in Latin works including "Catalogue of the Plants of England," "New Method of

Plants," "Universal History of Plants," "Synopsis of Quadrupeds and Serpents"; in English, "Glossaries of North and South Country Words," and "The Wisdom of God Manifested in the Works of Creation." He edited the "Ornithology" and "History of Fishes" of Willoughby. His system of botanical classification was substantially adopted by De Jussieu in the next century.

Ray'mond, Henry Jarvis, 1820–69; American journalist; b. Lima, N. Y.; became assistant editor New York *Tribune* on its establishment, 1841; office editor of New York *Courier and Enquirer*, 1848; elected to New York Assembly as a Whig, 1849, 1850; issued the first number of the New York *Times*, September 8, 1851; edited the paper until his death; active in the Baltimore Whig Convention, 1852; elected Lieutenant Governor of New York, 1854. He was prominent in the organization of the Republican Party, 1856; elected member and Speaker of New York Assembly, 1861; president of Union Convention at Syracuse, 1862; chairman of New York delegation in the National Republican Convention, 1864; elected to Congress, 1864; took part in convoking the Philadelphia "Loyalists' Convention," 1866, and wrote its "Address and Declaration of Principles"; author of "The Life and Public Services of Abraham Lincoln."

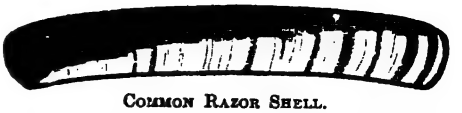
Raymond, John T. (original name, JOHN O'BRIEN), 1836–87; American actor; b. Buffalo, N. Y.; made his first appearance in Rochester, 1853 as *Lopez* in "The Honeymoon"; afterwards appeared at Charleston, S. C., as *Asa Trenchard* in "Our American Cousin," with Edward Sothern as *Lord Dundreary*; played with Sothern in the same piece in London and the British provinces, 1867. In 1868 he appeared in New York as *Toby Twinkle* in "All That Glitters Is Not Gold"; 1869 played in San Francisco as *Graves* in Bulwer's "Money"; brought out at the Park Theater, New York City, 1874, Mark Twain's "The Gilded Age," and as *Col. Mulberry Sellers* achieved his greatest success.

Raymond Lul'ly. See LULL, RAMON.

Raynal', Guillaume Thomas François, 1713–96; French historian; b. St.-Geniez, Aveyron; joined the Jesuits; became, 1747, a priest of St. Sulpice, Paris, but was soon dismissed for offensive conduct, and, leaving the Church, took up literary work; published numerous volumes, including "History of the Divorce of Henry VIII from Catharine," "Philosophical and Political History of European Settlements and Commerce in the Two Indies," which was condemned and ordered to be burned by Parliament, so liberal were its sentiments. To escape arrest, Raynal fled to Switzerland; later lived at the court of Frederick II; was allowed to return to France, 1788; elected to the States General, 1789.

Ra'zorback, one of the largest species of the whale tribe, the *Balænoptera* or *Rorqualus borealis*, the great rorqual; name given to a kind of hog, especially in the S. part of the U. S.

Ra'zor Clam, common name of various bivalves of the genus *Solen*, in allusion to the shape of the shell.



COMMON RAZOR SHELL.

Read, Thomas Buchanan, 1822–72; American poet and painter; b. Chester Co., Pa.; studied sculpture at Cincinnati, but turned his attention to painting, which he practiced in New York City, 1841, and afterwards at Boston and Philadelphia; went to Florence, Italy, 1850, and resided there, with few intermissions, till 1872; author of. "Poems," "The New Pastoral," "The Wagoner of the Alleghanies," "A Summer Story," "Sheridan's Ride and Other Poems." Among his paintings are the well-known portraits of Mrs. Browning and of Longfellow's children, and the painting illustrating his "Sheridan's Ride."

Reade, Charles, 1814–84; English novelist; b. Ipsden, Oxford; called to the bar, 1843; published, 1852, "Peg Woffington," a novel, which gave him an immediate reputation, and afterwards issued many novels and tales, among which are "Christie Johnstone," "Never Too Late to Mend," "Love Me Little, Love Me Long," "The Cloister and the Hearth," "Hard Cash," "Put Yourself in His Place," "A Terrible Temptation," "A Woman Hater," etc. Most of his novels were successfully dramatized by himself or by Boucicault, and he wrote several independent plays.

Reading (rĕd'ĭng), capital of Berkshire, England; on the Kennet, near junction with Thames; 36 m. W. of London; contains ruins, surrounded by public gardens, of a Benedictine abbey founded by Henry I; modern structures include the Renaissance municipal buildings, containing a free library, science and art schools, etc.; the assize courts, and the grammar school. Reading has manufactures of silk, velvet, and ribbons, a huge biscuit factory, and adjoining the town is a seed nursery covering 10,000 acres. Pop. of municipal borough (1908) 81,647.

Reading, capital of Berks Co., Pa.; on the Schuylkill River and Canal; 54 m. E. by N. of Harrisburg; is in a farming region; has large trade and excellent shipping facilities; is noted for its manufactures, especially of iron and steel; has a water system that cost $1,500,000, Mineral Springs and Pennsylvania Common parks, principal shops of the Philadelphia and Reading Railroad, manufactures of foundry and machine-shop products, woolen hats, malt liquors, hosiery, stoves, brick and tile, brass goods, and planing-mill products; Reading, St. Joseph's, and Homœopathic Medical and Surgical hospitals, Home for Orphans, about sixty churches, and public-school property valued at $1,216,850. Reading was founded, 1748, incorporated as a borough, 1783; chartered as a city, 1847. Pop. (1910) 96,071.

Readjust'ers, in U. S. history, a party in Virginia, indorsed by the Republicans, who

favored a partial repudiation of the state debt, which in 1861 was over $33,000,000; with interest, amounted to $45,000,000 in 1875. Various vexatious attempts were made to pass laws to prevent the bondholders from realizing on their coupons. In 1878 the unpaid interest was funded at fifty cents on the dollar and new bonds issued. In 1879 an attempt to scale down the debt was vetoed by the Democratic governor. In 1892 an arrangement was finally made with the creditors.

Re'al, in Spanish and Portuguese countries, a coin and money of account. The old silver real (the eighth of the *piastre, peso,* or dollar) was long a familiarly current coin in the U. S., where it was worth twelve and a half cents, and bore various popular names. In Spain the real is now about five cents. In Portugal forty reis make one real, but it is never coined. In Spanish America the real has various local values.

Real'gar, mineral disulphide of arsenic, a resinous-looking ruby-red or orange-yellow mass, transparent or translucent; also called *red orpiment* and *ruby sulphur*; may be prepared artificially by melting together one part of sulphur and two parts of arsenious acid, and by melting metallic arsenic with sulphur or orpiment. Realgar is used as a pigment, though not so much as formerly.

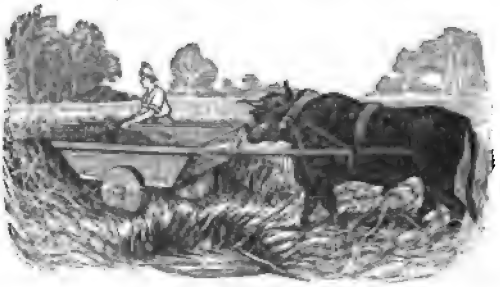
Re'alism, as opposed to nominalism, the doctrine that universals (notions of species and genera, such as *man, animal*) have real existences corresponding to them. In the Middle Ages the disputes of the SCHOOLMEN developed this doctrine into sharp contrast with nominalism. The dispute was not an idle one, but involved the theological and metaphysical question of personal individuality. At an earlier period Boethius and St. Augustine had been decided Realists; so were all Platonists and Neoplatonists. Roscellinus in the eleventh century boldy announced nominalism, and applied it to the Trinity, making three Gods, but no unity. Realism prevailed against him, if not by argument, at least by authority. The great Realists of the eleventh and twelfth centuries were Anselm, William of Champeaux, Gilbertus Porretanus, John of Salisbury; of the thirteenth century, Alexander of Hales, Bonaventura, Albertus Magnus, Thomas Aquinas, and Duns Scotus. Their doctrine was *universalia ante rem* (in God's mind), *in re* (in things), and *post rem* (in man's thought). Realism may be (*a*) psychological, holding in regard to artificial things—*e.g.,* table or chair—that the general notion or name conventionally signifies the purpose or design which creates such things, and therefore corresponds to what reality they possess; (*b*) natural, a realism which recognizes the natural objective processes in nature and mind.

Realism in Art, art or practice of expressing the real in contradistinction to the imagined, the ideal, or the traditional. Thus, in the choice of subject, the representation of a glory of angels may be called imaginative or imaginary. The frieze of the Parthenon is a strongly idealized treatment of a procession, very abstract indeed, and not at all a complete statement of the facts. The picture of a saint with his or her attributes is generally very traditional. In opposition to these, realism would choose religious enthusiasm seen among living and humble people, or a faithful portrait of a military or civic parade, or a sailor risking his life in the way of duty. That is to say, the realist paints what he has seen and known, and whatever ideas of dignity or humility he may wish to convey will be given to the common scenes and the actual persons of his own experience. Apart from the choice of subject, realism chooses a manner of representing men and things which will give them nearly as they are to ordinary human observation.

Real Pres'ence, Doc'trine of the, part of the professed belief of the Roman Catholic, Greek Catholic, and other ancient churches, according to which "Christ is contained whole and entire under either species—*i.e.,* that His body, blood, soul, and divinity are given both under the form of bread and under that of wine." In the Anglican Church the real presence is maintained, but so defined as to avoid the imputation of being a belief in the corporal presence—*i.e.,* in "the presence of the holy sacrament of the Lord's Supper of the body and blood of Christ in a corporeal or materially substantive manner." On the contrary, the real presence is not "to be sought for in the sacrament, but in the worthy receiver of the sacrament"; but as, "with the natural bread in the sacrament, there is present the spiritual bread which is Christ's body," it is none the less real. See EUCHARIST.

Real Prop'erty. In the law of the U. S. and of England the term "real property" or "real estate" is applied to all those species of property where the material objects over which the rights of ownership or of user extend over things real—that is, lands or articles regarded by the law as equivalent to land. The term "land" includes not only the soil, but also all those objects which are either actually or constructively attached or affixed to it so as to become in contemplation of the law a part thereof. It also embraces rents, franchises, and the extensive group of rights in or over the land of another person which are collectively known as "easements" or "servitudes."

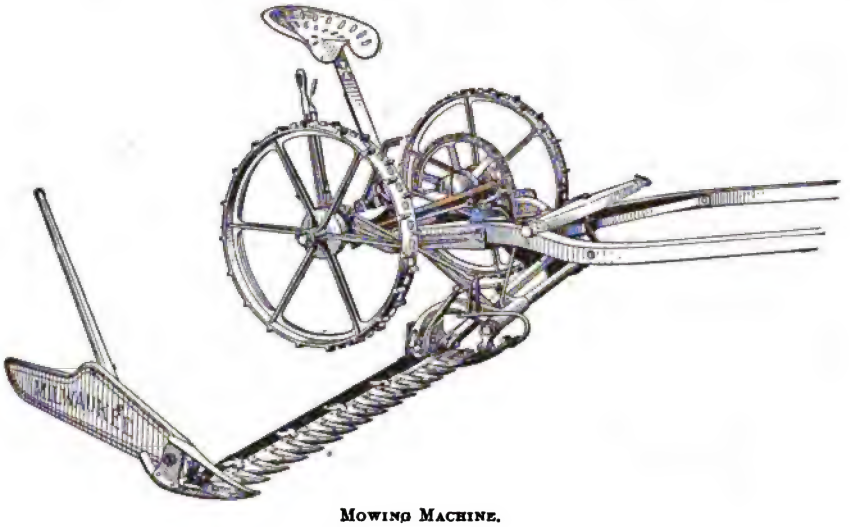
Reap'ing and Mow'ing Machines', mechanical devices for cutting grain or grass, usually by



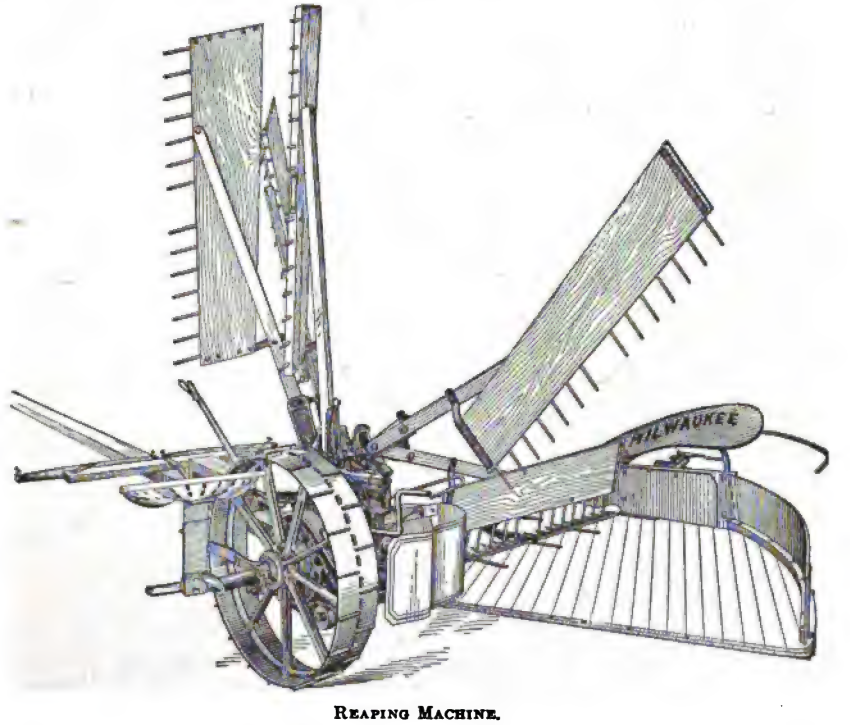
REAPER USED BY ANCIENT GAULS.

animal power. Though this invention was suggested by the ancient Romans, the first

experiments toward practical results were made in Europe in the latter part of the eighteenth and early part of the nineteenth century. The first machines which attained to much efficiency were made in the U. S. between 1830 and 1850. Most of the early machines had the power applied behind. In 1806 Gladstone, of England, patented a front-draft, side-cut machine having a revolving knife. A bar with fingers gathered the standing grain and held it to the knife. Ogle, 1822, made the first reciprocating knife, also attached to a forward-draft machine. He used a reel to carry the grain to the cutter, and also a platform which was tilted to drop it in portions. Bell's machine (1826) had a reel and a traveling apron which carried off the grain to one side. In 1834 Cyrus H. McCormick, of Virginia, patented a reaper, which was improved, 1845 and 1847. It had a sickle-edged sectional



MOWING MACHINE.



REAPING MACHINE.

knife, reciprocating by crank movement with the bearing and drive wheels.

The practical use of self-rakers in the U. S. dates from the invention of W. H. Seymour, of New York, in 1851, who arranged a quadrant-shaped platform directly behind the cutters, a reel to gather the grain, and a rake moving over the platform in the arc of a circle, depositing the sheaves on the ground. In 1856 Owen Dorsey, of Maryland, combined the reel and rake. His improvement has been extensively used, with some modifications, one of which was by Johnston, 1865, who arranged it so that the size of the sheaves, or gavels as they are called, could be regulated by the driver. In the self-binding machines the grain is delivered by the elevating aprons on a slanting table, where iron packers work continuously through slots in the table and rake the grain down to the knotter and upon a trip finger, which automatically sets the knotter in motion when enough grain has accumulated for a bundle. The knot is tied in the cord by a single revolution of a bill-shaped hook with a hinged tongue that is moved by a cam. The self-binder has rapidly replaced the self-rake reaper. Briggs and Carpenter, 1836, secured patents for a heading machine; since then over 100 have been granted on these machines, which have proved to be well adapted to cutting large harvests in dry climates.

The combined harvester unites the header, thresher, and separator, fanning mill, sacker, and straw carrier in one machine. The large machines are propelled either by a traction engine or by thirty to thirty-six horses. If steam power is used, seven men are required; if horse power, four. Either form will cut from 60 to 125 acres and thresh from 1,700 to 3,000 bu. daily. The corn harvester is the greatest improvement in the late inventions of harvesting machinery. It is the binder modified, strengthened, and adapted to the heaviest and most difficult work—that of cutting, elevating, and binding corn 8 to 14 ft. high, weighing from 15 to 25 tons per acre. Separate machines for mowing are now the rule; they are without reels or platforms. The cutter bar is hinged at the inner end to allow it to follow the inclinations of the ground. Levers are provided for elevating or depressing the cutter bar and for controlling the dip or angle of the guards and knives. Rear-cut machines were most common prior to 1880; since that time front-cutting machines have come into general use.

Rea'son, the conscious intelligence of man as contrasted with the instinct of animals. From this ability to adapt means to ends is derived the expressions "reasonable," *i.e.*, according to a proper regard for the adaptation to ends, and "rational," meaning the correct appreciation of this adaptation. In a second signification, reason is the ground motive or cause, the "reason why anything is or is done."

In logic reasoning is the comparison of two judgments, so that a third judgment, or conclusion, is derived from them. Thus: "All men are mortal. Socrates was a man, therefore Socrates was mortal." Reason is either inductive or deductive. Reason is among the latest of the mental faculties to reach its full development, so too much should not be attempted in the early education of a child. See JUDGMENT.

Réaumur (rā-ō-mūr'), **René Antoine Ferchault de,** 1683–1757; French natural philosopher; b. La Rochelle; studied law at Bourges; settled in Paris, 1703; first made known in France, 1722, the process of manufacturing steel; and received a pension of 12,000 livres, which he applied to the encouragement of the industrial arts. He invented a process for tinning iron, made an opaque white glass known as "Réaumur's porcelain," and invented, 1731, the thermometer which is called after him. He investigated many curious topics in natural history, especially entomology, publishing "Memoirs Illustrating the History of Insects" (6 vols., 4to), and many papers in the academical transactions.

Re'bate, a reduction or allowance made to a purchaser in consideration of cash payment, exclusive custom, or other reasons. In ordinary business such rebates are generally allowed under the form of discounts or in accordance with a general agreement covering all transactions during a certain period. But in the U. S. such discriminations when made by common carriers so as to permit large shippers to enjoy cheaper transportation facilities has caused such economic and political agitations as led to the enactment of several laws. The Elkins Act of 1903 made any such discrimination between shippers in interstate commerce punishable by fines ranging from $1,000 to $20,000. The Railway Rate Law of June 29, 1906, made the offense punishable by two years imprisonment. The principle of justice underlying these laws is that while competition should not be hampered, and everyone has the right to buy as cheaply as he can and sell at the highest price, yet in the case of railroads which hold practically a monopoly in the carrying of goods public policy requires that everyone shall have the right to ship the same class of goods the same distance at the same rate. It is acknowledged that many of the largest trusts in the U. S. have been built up by arrangements with railroads, so that their large shipments should be carried at a net rate less than the shipments of the smaller competitors. Indeed, in some cases rebates have been granted to the large concerns upon the freight paid by the smaller shippers. The bulk of the work of the Interstate Commerce Commission consists in the enforcement of equitable schedules for the carrying of goods by rail.

Re'bec, musical instrument introduced by the Moors into Spain, whence its use spread over Europe. It was a precursor of the violin, and was of various sizes. From the neck it grew larger until the base was reached. It was played with a bow.

Recall', in politics, a procedure by means of which undesirable officials may be recalled from office by a petition of a certain percentage of the voters for a recall election, and by an affirmative majority at each election. The

principle of the recall was first devised by Los Angeles, Cal., abt. 1903, and its first use was the recall of a Los Angeles councilman; in 1908 it effected the removal of the Los Angeles mayor. Recall provisions have been adopted by a number of towns in the Western States, and on June 1, 1908, Oregon, under an initiative petition, amended her constitution whereby she became the first state providing for the removal of public officers by recall election.

Récamier (rā-kă-mē-ā'), **Jeanne Françoise Julie Adelaïde Bernard,** 1777–1849; French society leader; b. Lyons; married, 1793, Jacques Récamier, a Paris banker, three times her age; made her house the gathering place of a group of brilliant personages, among whom Chateaubriand and Ballanche were conspicuous; reactionary political and religious ideas there current made her the object of Napoleon's displeasure, and, 1811, she was ordered to leave Paris; at the restoration she returned to Paris and established herself modestly in the old Abbaye-aux-Bois, where she again became the center of a brilliant intellectual circle. Her beauty and intelligence gained her many worshipers and suitors.

Recap'ture, in international law, the recovery of a captured vessel by a cruiser of the same nation or an ally. If retaken before any sentence of a prize court of the captor's sovereign has decided on the validity of the capture, and thus determined the ownership of the captured vessel, it goes to the owner; after such sentence, if retaken, it goes to the captor. The captor in the first of these two cases is entitled to a reward. The amount of salvage payable to the recaptor by an owner differs. In Great Britain and the U. S. the usual rate is one eighth of the value of ship and cargo, though the latter nation observes reciprocity in the matter, levying the same rate that would be applied to its ships by the state to which the recaptured vessel belongs.

Receipt', the transaction by which property is delivered by one to another, or a writing acknowledging such a transaction. It is used in the first sense in the Statute of Frauds. A written receipt is to be distinguished from a release in that it does not destroy a subsisting right, but is merely evidence of a fact, and therefore may be explained or refuted. As it is merely evidence of a fact it is not a contract, although the written instrument in which it appears may contain a contract also. A familiar example is a bill of lading, which sets forth a receipt of certain goods by a carrier and a contract to transport them. It is at times difficult to decide whether a particular instrument is a simple receipt or superadds to this a contract obligation. Even in the latter case the receipt is open to explanation, except in cases where the contradiction of the receipt would work a destruction of the contract. Whether the person delivering property or making payment pursuant to a legal obligation has the right to a simple receipt has not been settled by the courts, but statutes give such a right in certain cases.

Receiv'er, person appointed by the court to receive rents, or profits of land, or other property which is in question between the parties to a litigation, or which belongs to one who is legally incompetent. The general principles on which a court of equity acts in appointing receivers are stated by the U. S. Supreme Court as follows: "A receiver is appointed upon a principle of justice for the benefit of all concerned. Every kind of property of such a nature that, if legal, it might be taken in execution, may, if equitable, be put into his possession. He is virtually a representative of the court, and of all the parties in interest in the litigation wherein he is appointed. He is required to take possession of property as directed, because it is deemed more for the interests of justice that he should do so than that the property should be in the possession of either of the parties in the litigation. He is not appointed for the benefit of either of the parties, but of all concerned. He has only such power and authority as are given him by the court, and must not exceed the prescribed limits. The court will not allow him to be sued touching the property in his charge, nor for any malfeasance as to the parties or others without its consent; nor will it permit his possession to be disturbed by force nor violence to be offered to his person while in the discharge of his official duties. In such cases the court will vindicate its authority, and, if need be, will punish the offender by fine and imprisonment for contempt."

Re'cent Pe'riod, in geology, a portion of time between the Pleistocene period and historic time, though this portion is usually included in the Pleistocene. During this period the aspects of nature, both as regards the organic and inorganic worlds, have remained essentially the same, but minor changes have been constantly going on that serve well to illustrate and explain the manner in which the globe has been revolutionized in past ages. These changes consist in the elevation and depression of coast lines, the scooping out of valleys, the draining and filling of lakes, the outbursts of volcanic matter, and the extinction of certain kinds of animal and vegetable life.

Rech'abites, descendants of Rechab, the father or ancestor of Jonadab. They were a branch of the Kenites (1 Chr. ii, 55), who entered Palestine with the Israelites. The Rechabites were strict abstainers from wine, and dwelt in tents (Jer. xxxv). There is a secret society of total abstinence men and women in the U. S. and Great Britain known as the Independent Order of the Rechabites.

Recife (rā-sē'fā). See PERNAMBUCO.

Reciproc'ity, in international law, the condition or relation existing by virtue of a species of treaty or convention between two or more nations, whereby each pledges itself to act in the same manner toward the other or others in reference to a given subject or to given subjects. The stipulations of a reciprocity treaty or convention should be perfectly mutual;

but a wider license is permitted in the actual practice, and if the stipulations are for the most part both in quality and quantity mutual, the term is used to denote this general mutuality in the agreements. Furthermore, the stipulations of the treaty or convention may be themselves of a general nature—as, for instance, in the use of what is termed "the most-favored-nation clause" in a treaty, whereby a treaty of reciprocity may be constructed without containing any particular specification of the manner in which the parties to the same shall act toward each other on the given subject or subjects, but only the general pledge that each will deal with the other in reference to the subjects mentioned as it does or shall with that nation which it favors, or shall favor, most on the same point or points. Numerous trade arrangements have been entered into by the U. S., as well as by European powers, on the basis of reciprocal or equivalent reductions in the duties on certain articles. A reciprocity treaty negotiated between the U. S. and Canada in 1911 provided for reciprocal tariff reductions on a wide variety of commodities. It was accepted by Congress but was repudiated by the Canadian electorate at a general election, September, 1911.

Recitative (rĕs-ĭ-tā-tēv′), species of artificial declamation adapted to musical notes, imitating the inflections of natural speech, and forming a medium between ordinary recitation or speaking, which it nearly resembles, and measured air or song. It was first introduced at Rome by Emilio del Cavaliere, 1600; now a recognized form of vocal composition in opera, oratorios, and cantatas.

Réclus (rā-klü′), **Jean Jacques Elisée,** 1830–1905; French geographer; b. Ste. Foy-la-Grande; traveled extensively in Great Britain and N. and S., 1851–57; sided with the Commune, 1871; sentenced to death, but banished on appeal of eminent scientists; returned to Paris; involved in communistic plots; fled to Switzerland; and, 1894, though absent, sentenced to twenty years' banishment; works include "The Earth," "The Ocean, Atmosphere, and Life," and "New Universal Geography" (19 vols., 1874–94), the most complete geographical survey of the world ever written.

Recluse′, strictly, a monk or nun who from choice retired from communication even with members of the same order. The door was sealed in the presence of a superior officer, and could be unlocked only by the command of a bishop.

Recognizance (rē-kŏg′nĭ-zăns), in law, an obligation of record which a man enters into before some court of record, or magistrate duly authorized, with condition to do some particular act, as to appear and answer in criminal proceedings, to prosecute a case or an appeal, to keep the peace, etc. The recognizance is an acknowledgment (recognizing) of the existence of a debt or obligation appearing on the record of the court, and need not be, like a bond, sealed and signed by the party. It is proceeded on by a writ of *scire facias* or a summons, without the necessity of an action as in the case of a common bond. At common law it is a preferred debt, but in many states of the U. S. the preference has been abolished or modified. See BOND.

Rec′ollet Fri′ars and Nuns, name usually applied to one of the congregations of Franciscans of the strict observance, but sometimes designating reformed bodies of other orders. A congregation of Augustinian Recollets dates from 1530. The Franciscans who bear this name are especially those of the French congregation, founded, 1592, by the Duke of Nevers, Louis de Gonzaga (1539–95).

Reconcentra′dos, Cubans who by order of Gov.-Gen. Weyler, issued October 21, 1896, were "reconcentrated," or removed from their homes to cities and towns where they were under the control of Spanish garrisons, and thus prevented from giving the insurgents aid in the way of food, shelter, or information. Nearly 400,000 were thus transported and forced to live in what were virtually prison yards, their homes, meantime, having been destroyed and their lands or estates devastated. The starvation and disease caused by insufficient and improper food and the unsanitary condition under which these people were forced to live, resulted in the death of 200,000. In November, 1897, Gen. Blanco modified Weyler's order slightly, but with little practical effect. In December, 1897, Pres. McKinley, in his annual message, appealed to the people of the U. S. to aid the sufferers. Through the Red Cross Society money and supplies exceeding in value $200,000 were distributed, but did not wholly relieve the horrors of the situation, the effects of which were felt long after the Reconcentrados were allowed to return to their homes and Cuba was freed from Spanish rule.

Reconnaissance (rē-kŏn′nĭs-săns), preliminary or rough survey of a portion of country. A civil reconnaissance may be undertaken for the purpose of selecting suitable points for trigonometrical stations preparatory to a geodetic survey; for ascertaining the relative advantages and disadvantages of two or more routes preparatory to locating a line of railway, canal, or aqueduct; or for the purpose of acquiring a general idea of the features of an unexplored country. A military reconnaissance may be undertaken to ascertain the military resources of a tract of country, for determining the best line of march for an army; or for obtaining information in regard to the military character of a defile, of a crossing, or of a position of defense. The information obtained by a reconnaissance is usually embodied in a map and an accompanying memoir. The map is intended to show the general topographical features of the country examined, and the memoir that gives information cannot be presented by the map.

Rec′ord, official contemporaneous memorandum in writing, drawn up by the proper officer of a court of justice, and containing a summary statement of the proceedings in an action

at law brought before that court. It comprises a short history of the case and the proceedings consequent thereon, as the nature of the action, the names of the parties and the time of their appearance in court, and the acts of the court itself during the progress of the pleadings, arranged in the order of their occurrence, the whole concluding with the judgment of the court. Records in this sense are peculiar to the common law; and as they form the only strict and proper proof of the proceedings of the courts in which they are preserved, they are regarded with particular consideration, and are generally a proof of such a high and absolute nature as to admit of no contradiction. The peculiar privilege of some courts to have these memorials has of itself created the distinction, equally recognized in English and American law, between courts of record and courts not of record. Though courts not of record may keep minutes and memorials of their proceedings, such minutes are not properly records.

Also the evidence of title to real estate, by the record or register of title deeds. The usage has prevailed from the early settlement of New England, and is now universal throughout the U. S. The statutes of the various states differ in some respects; but the principle in all is the same, and all make such record absolutely necessary to render the purchaser's title valid against creditors and subsequent *bona fide* purchasers.

Recoup'ment, species of defense in actions brought to recover damages for the nonperformance of a contract, whereby the defendant alleges that he has himself sustained damages by the plaintiff's breach of the same contract, or by the plaintiff's fraud in procuring him to enter into it, which he seeks to cut off or "recoup" from the amount that would otherwise be recovered against him.

Recov'ery, Com'mon, method of conveying lands, also called *feigned recovery,* formerly used in England as a means of evading the statute *De Donis* (see ENTAIL) and conveying an entailed estate free of the entail, or for enlarging the estate of the tenant in tail to a fee simple, by a secret confidence that the person recovering the estate would reconvey to the party in fee simple. It consisted in a fictitious real action founded on the supposition of an adverse claim, which by the collusion of the owner of the entailed estate was carried regularly to a judgment against the owner in tail for the recovery of the land by the demandant or plaintiff. In the U. S. common recoveries were formerly in use in some states; but they have generally become obsolete where they have not been expressly abolished.

Rec'tum, the lowest portion of the intestines, continuing from the colon above and ending at the anus. Its natural function is that of a temporary reservoir for fecal matter. The muscular coat of the walls of the rectum is thick and strong, and its contraction, assisted by other muscles, enables the rectum to void its contents. The rectum is lined with mucous membrane. It has some absorbing capacity, which is utilized to sustain a patient who is incapable of taking nourishment in the usual way. The absorption of poisonous substances due to the habit of delaying the functions of the rectum is one of the worst results of constipation.

Recu'sant, term used in English ecclesiastical history to designate persons who refused or neglected to attend divine service on Sundays or holidays in the Established Church, or to worship God according to its forms. Recusancy was made a legal offense in the first year of Queen Elizabeth, and many statutes against it were subsequently enacted, with very severe penalties; some of these still exist, though they are seldom enforced.

Red'bird. See CARDINAL GROSBEAK.

Red'breast. See ROBIN.

Red Ce'dar Riv'er. See CEDAR RIVER.

Red Cross, name applied to the international treaty arranged by the Geneva Convention of 1864, as well as to the societies organized to carry out its aims. These center in the cause of humane treatment of wounded, sick, and dying soldiers in time of war. The red cross on a white ground is the distinctive flag designated in the treaty, by which all hospitals, persons, and appliances employed in the relief service are known as such; and whenever the flag is displayed, accompanied by the national flag to which the hospital, etc., belongs, it is respected as neutral. Under the treaty disabled soldiers who have fallen into the hands of the enemy may be sent through the lines; if healed in the hands of the enemy and incapable of bearing arms, they must be delivered to the outposts to be sent to their homes, on request; if capable of further military service, they may be sent to their homes on condition of not again bearing arms during the war. The Geneva conference stipulated that each treaty nation shall have one national committee or society, civil in character, which shall be the medium of communication with its government, and shall alone possess the right to use the red cross.

On the formation of the American National Red Cross in 1881, its president, Miss Clara Barton, perceived a far wider usefulness for its work by applying it to the relief of great national calamities other than war, such as famine, pestilences, fires, or cyclones, and incorporated such features in the charter of the association in 1893. The American Red Cross was reorganized and incorporated by Congress, 1905 and again, 1917, when the President placed it on a strictly military basis under two chief officers, former President William H. Taft and Henry P. Davison. Up to Oct. 23, 1918, the American Red Cross, had gained a popular membership of 20,648,103, besides another of 8,000,000 in its Junior Red Cross, and had received in cash and material values a net total of about $325,000,000. This magnificent total was largely increased during 1919, as the work abroad and at home was far from ended, and much educational work was undertaken.

Red Deer. See STAG.

Red'dle, Raddle, or **Red Chalk,** clayey oxide of iron exported from Germany and England; used for carpenter's chalk, for marking sheep, for drawing on paper, and in the case of fine grades for polishing spectacle lenses.

Redemp'tionists, called also MATHURINS, FATHERS OF MERCY, and TRINITARIANS, brotherhood of Roman Catholic Church founded by John de Matha and Felix of Valois at Cerfroi, France, for the deliverance of Christian captives in Barbary; was approved by Innocent III, 1199.

Redemp'torist Fa'thers, or **Liguo'rians,** congregation of missionary priests founded 1732 by Alfonso de' Liguori at Scala, Italy; most numerous in Italy, Austria-Hungary, and the U. S.; devote themselves chiefly to the holding of "missions" for the increase of religious activity among the people.

Red'field, William C., 1789–1857; American meteorologist; b. Wallingford, Conn.; settled in New York City; engaged in steam navigation and railroad construction; first published his "Theory of Storms," 1831, and three years later an elaborate article on the hurricanes of the W. Indies; after 1836 devoted much time to investigation of the fossil fish of the Connecticut valley and the sandstones of the Atlantic coast; published sixty-two essays, of which forty pertain to meteorology.

Red'grave, Richard, 1804–88; English painter; b. London; celebrated for his genre pictures, and later for his landscapes; was head master of the Government School of Design; promoter of the S. Kensington Art Museum; inspector general of art schools; surveyor of crown pictures; author of "An Elementary Manual of Colors" and, with his brother Samuel, of "A Century of Painters of the English School"; paintings include "Sermons in Stones," "Startled Foresters," "Tranquil Waters," "Calling the Sheep to Fold," and "A Well-spring in the Forest."

Red Grouse, or **Moor Fowl,** ptarmigan of the British Islands (*Lagopus scoticus*); one of the most prized of British game birds; is not only shot extensively by sportsmen, but is snared for market, and even bred in confinement for food; is about 16 in. long, mostly of a red-brown color, and feathered to the toes.

Red Jack'et (SA-GO-YE-WAT-HA), 1752–1830; principal chief of the Seneca Indians; b. Old Castle, near Seneca Lake, N. Y.; in early life was employed as a messenger, first among his own people, and during the Revolutionary War as a runner for British officers on the border. In 1809 he gave information to Erastus Granger, the Indian agent, of the organization by Tecumseh of a league by which the Senecas were to be drawn into a combination against the U. S. In 1810 he visited Washington, and delivered an able speech on this subject before the Secretary of War. Red Jacket was on the warpath during both conflicts between the U. S. and Great Britain—in the first on the British and in the second on the American side. His intellectual powers were of a very high order.

Redoubts', small forts or inclosed works (usually) without flanking defenses, generally auxiliary to some larger work or defensive system. In permanent fortification the term is applied to small works or intrenchments within a larger member—*e.g.*, "redoubt of the demilune," "of the reëntrant place of arms," etc.

Redouté (rē-dō-tā'), **Pierre Joseph,** 1759–1840; French painter; b. near Liège; settled in Paris, and, 1822, became Prof. of Vegetable Iconography of the Jardin des Plantes; excelled in painting flowers, and his works, "Les liliacées" (eight volumes) and "Les roses" (three volumes), are the finest known specimens of botanical illustration.

Red Riv'er, tributary of the Mississippi, which rises in NW. Texas, about lat. 34° 40′ N. and lon. 102° 10′ W., and flows E. to the 100th meridian. Thence it runs a little S. of E., separating Texas from Indian Territory and Arkansas; bends S. at Fulton, passes into Louisiana, and enters the Mississippi 341 m. above its mouth; length, about 1,200 m.; basin about 97,000 sq. m. in extent. The river is generally highest from December to June or July, the rest of the year being the season of low water. The "great raft," an immense collection of trees and driftwood, in NW. Louisiana, was a serious obstacle to navigation till removed by the U. S., 1873. Red River receives its name from its peculiar color, supposed to be derived from the red clay of the gypseous formation through which its upper course lies. Of its tributaries the Washita is the most important. In Louisiana it sends off numerous bayous, which find their way back again to the main stream, forming frequent lakes. In the spring of 1864 an immense expedition of combined land and naval forces, under Gen. Banks and Admiral Porter, was sent up Red River to capture Shreveport and open up the cotton districts of Texas. It was unsuccessful.

Red River of the North, stream rising in Elbow Lake, Minn., about lat. 47° 10′ N. and lon. 95° 25′ W.; flows S. 100 m. to Otter Tail Lake, and thence W. 100 m. to Breckinridge, whence it runs N. about 550 m., separating N. Dakota from Minnesota and dividing Manitoba into two unequal parts, and falls into the S. extremity of Lake Winnipeg through six mouths. It is very tortuous. Two or three small steamers ply in summer between Moorhead, Minn., and Winnipeg, Manitoba. The largest tributary is the Assiniboine, in Manitoba.

Red Rus'sians. See RUTHENIANS.

Red Sea, or **Ara'bian Gulf,** inlet of the Indian Ocean; between Arabia on the E. and Abyssinia, Nubia, and Egypt on the W.; separated from the Mediterranean by the Isthmus of Suez, 80 m. across, and communicating with the Indian Ocean through the Gulf of Aden and the Strait of Bab-el-Mandeb, 14 m. broad; length, 1,450 m.; greatest breadth, 230 m.; depth varies from 1,054 fathoms in lat. 22° 30′

N. to 3 fathoms in the harbor of Suez. It is called in the Old Testament "the sea of *suph*," a seaweed resembling wool. Near its N. extremity the sea forks into two branches—one, the Gulf of Akaba, length 100 m. and breadth 15, occupies a depression which is the continuation of the valley of the Jordan and Dead Sea; the other, the Gulf of Suez, length 200, breadth 20 m. In the Sinaitic isthmus, between these arms, is Mt. Sinai. The Israelites are supposed to have crossed in April the Gulf of Suez, near the existing town of that name, the sea at that time extending, with small depth, some 30 m. farther N. The navigation of the Red Sea has always been very difficult; but from the earliest times it has formed one of the commercial highways of the world, being the shortest and most convenient road between Europe and India.

Red Sea'weeds (*Rhodophyceæ*), a class of aquatic plants (mostly marine) notable for their red or purple color. The many-celled plant body is of various forms, from a simple flat thallus to a branching, leaf-bearing axis. Sexual reproduction takes place by the fertilization of a carpogone (by nonciliated antherozoids), this resulting in the growth of carpospores, and sometimes of a pericarp also. Asexual reproduction takes place by the germination of tetraspores, which are produced in various places on the plant body by the subdivision of cells into four parts. The class is equivalent to the *Rhodospermeæ* of many authors, and includes but one order (*Florideæ*). The known species are between 1,500 and 2,000, widely distributed in all seas, and to a limited extent in fresh water. The plants are never of large size, rarely attaining a length of more than a few inches, and in some cases they are minute. They are frequently of delicate texture and beautiful outline. The red or purple color is due to the presence in the cells of a soluble substance, phycoerythrin, which hides the chlorophyll. Upon immersion in fresh water the red color of many marine species is discharged, thus disclosing the underlying green.

Reduc'tio ad Absur'dum, process of reasoning by which the statement in dispute is made one premise of an argument and an acknowledged truth the other, the conclusion drawn from them being so absurd that the falsity of the premise in dispute must be conceded.

Red Wa'ter, or Black Water, disease of cattle, sheep, and goats, characterized by the passage of reddish, brown, or black urine; most frequently observed among cattle at pasture on low lands, new fields, or soils imperfectly drained; thought to be caused by irritating plants which grow in such localities.

Red-winged Black'bird. See BLACKBIRD.

Red'wood (*Sequoia sempervirens*), a noble coniferous timber tree of California, second in size to the *S. gigantea*, or big tree, alone among N. American trees; occurs in great forests on the coast mountains of N. Carolina, and often attains a height of 275 ft. and a diameter of 15 ft. When fresh its wood is of a fine red color, but slowly fades when exposed to light. The redwood sometimes used by dyers is from

THE GIANT REDWOOD OF CALIFORNIA.

Adenanthera pavonina, a large leguminous E. Indian tree.

Reed, Andrew, 1788–1862; English philanthropist; b. London; 1834 was deputed, with Rev. James Matheson, by the Congregational Union of England and Wales, to visit the U. S. and report on the state of religion and education there; and on his return published, with Mr. Matheson, "Visit to the American Churches." He founded the London Orphan Asylum, 1813; the Infant Orphan Asylum, 1827; the Asylum for Fatherless Children, at Croydon; the Asylum for Idiots, at Reigate, and the Royal Hospital for Incurables, and left bequests to each.

Reed, Sir Edward James, 1830–1906; British naval constructor; b. Sheerness, Kent; studied at the School of Mathematics and Naval Construction, at Portsmouth; was attached to the dockyard at Sheerness; became secretary of the Institute of Naval Architects. In 1863 he submitted to the Admiralty proposals for reducing the dimensions, cost, and time required for building ironclads, and was soon after appoint-

ed chief constructor of the navy. Within three years he designed nearly the whole of the first fleet of ironclads of the British navy; an ironclad frigate for the Turkish navy, five steam transports of 4,000 tons each for the Indian Govt., and numerous smaller vessels. He also designed armored ships for the German and various other governments. After seven years as chief naval constructor, he resigned because he did not approve the construction of rigged seagoing turret ships. He was a Liberal member of Parliament, 1874–95 and 1900–5; writings include "Our Ironclad Ships," "Stability of Ships," "Modern Ships of War," and other works.

Reed, Joseph, 1741–85; American patriot; b. Trenton, N. J.; studied law in England, 1763–65; became deputy secretary of New Jersey, 1767; settled at Philadelphia, 1771; member of the Committee of Correspondence, 1774; president of the first provincial convention of Pennsylvania, January, 1775; delegate to the Continental Congress in May; volunteer at the battles of Brandywine, Germantown, and Monmouth; elected to Congress, September, 1777; signed the Articles of Confederation, 1778; president of the Supreme Executive Council of Pennsylvania; opponent of slavery and the proprietary system of government.

Reed, Thomas Brackett, 1839–1902; American legislator; b. Portland, Me.; admitted to the bar, 1865; began practice at Portland; member Maine House of Representatives, 1868–69; state senate, 1870; Attorney-general, 1870–72; City Solicitor of Portland, 1874–77; Republican member of Congress, 1877–99; Speaker, 1889–91, 1895–97, and 1897–99. When first elected Speaker he entered on a course that provoked bitter opposition, but resulted in revolutionizing the parliamentary procedure of the House. He insisted on counting as present those members who, in order to prevent a quorum, refused to vote. His rulings were sustained, and the principle was embodied in the new rules, adopted February 14, 1890. He resigned and retired into private life, 1899.

Common Reed.

Reed, name proper to certain tall woody grasses smaller than canes and bamboos. The common reed (*Phragmites communis*) of N. America, Europe, and Asia is employed on the E. continent as thatch, as a material useful in clay walls and floors, etc. The more extensively grown reed of Europe is *Arundo donax*, the woody stems of which are used for a great variety of purposes, especially by the horticulturist, and in making musical instruments, fishing rods, canes, etc. The smaller cane of the U. S. (*Arundinaria tecta*) is often called a reed. Its chief use is in making stems for tobacco pipes.

Also the name of the vibrating tongue or spring, fixed in a narrow slit, which produces musical tones in many wind instruments, such as the melodeon. It was once made of the reed (*Arundo donax*), whence the name.

Reed Bird. See Bobolink.

Reed In'struments, large class of musical instruments, of which the melodeon, the harmonium, and reed organs are the most important. The tone of these instruments is produced by a thin tongue of wood or metal lying within or over an aperture (technically called a reed), and vibrated by a current of air. Instruments of this class were found among the Chinese several hundred years ago, but most of them are comparatively modern inventions. The first reed organs were constructed in the U. S. abt. 1818; they were improved, 1821, 1825, and 1835, since which time the modifications have been numerous. The accordion was invented in Germany abt. 1829; the harmonium, first constructed in France soon afterwards, was later much improved by the introduction of the exhaust bellows, and the bending and twisting of the tongue of the reed, termed voicing, was developed. These two improvements have been the main features which have wrought such changes in the modern reed organ.

Reefs, Coral. See Coral.

Reeves, John Sims, 1822–1900; English singer; b. Shooter's Hill, Kent; at eight could read any music at sight; at fourteen was organist and choirmaster of the village church; became proficient in harmony and counterpoint; under name of "Johnson," at Newcastle-on-Tyne, made his first real public appearance, 1839, singing the part of the *Gypsy Boy* in "Guy Mannering"; voice at this time was barytone; was not until 1847 that he sang as a tenor. After studying in Paris and Milan he made his Italian début at La Scala Opera House, Milan; appeared, December 6, 1847, at Drury Lane, London, as *Edgardo* in "Lucia di Lammermoor," and was enthusiastically received; then devoted himself to sacred music, with which his fame and memory must always be associated. Singing in "Judas Maccabæus" at Exeter Hall, he astonished the critics, who had not suspected his versatility. In 1892 he retired from the stage and became a professor in the Guildhall School of Music, London.

Reëxchange', in the usual application of the term. the loss resulting from dishonor of a bill in a country different from that in which

it was drawn or indorsed. A New York merchant wishes to pay a debt in London. He buys a bill on London; it is dishonored at maturity; he is entitled to the amount of money called for by the bill in London; he would not be indemnified by recovering in New York the amount of the bill with interest and protest fees; he has a right to draw in London a redraft on the drawer or indorser in New York for an amount which will put him at once in possession of the money called for and promised to him by the original bill; this redraft is called reëxchange. It will include not only the sum promised by the original bill, but the exchange on New York, the interest, and necessary expenses of the transaction.

Referen'dum, system of legislation which refers new laws, proposed or enacted, to the electors of a state for their confirmation or rejection. The referendum was incorporated in the Swiss Federal Constitution, 1848, though practiced in some of the cantons as early as the sixteenth century, and its application was extended 1874. It is now established in every canton but Freiburg. Whenever a petition demanding the revision or annulment of a measure passed by the legislature is presented by 30,000 voters, or the alteration is demanded by eight cantons, the law in question must be submitted to the direct vote of the nation. As a check on hasty or class legislation the referendum has proved its usefulness on many occasions. In eight cantons there is an obligatory referendum, which provides for the submission to the mass of the electors of every law and every expenditure beyond a fixed maximum; a demand for this submission is unnecessary. In Great Britain the Parish Council Acts, 1894, established a kind of referendum, forbidding any loan or expense involving an annual rate exceeding one penny in the pound to be incurred without the consent of the parish meeting and the district council. The referendum has been adopted in several cities and states in the U. S.

Reflect'ing Cir'cle, astronomical instrument for measuring angles by the reflection of light from two plane mirrors which it carries; differs from the sextant chiefly in having an entire circle.

Reflec'tion, act of the mind whereby it examines itself or looks on its own states as its objects; one of the most unique activities of the mental life; is different from simple consciousness, in that in the latter there is no such thing as self-examination, and no act of setting up a conscious relation between the subject, or thinker, and the object, or what he thinks about. Reflection in its full sense seems to characterize man alone in the range of animal life; although wherever there is the beginning of the notion of self there is also probably the beginning of this function of thinking about self which constitutes reflection. This mental act is the great resource of self-observation and analysis, on which the psychologist depends for most of his information. As a method, its use is called "introspection." In philosophy, reflection has always been the function on which idealistic thought has based itself.

Reflection of Light. See LIGHT.

Re'flex Ac'tion, direct response of the nervous system to external stimulation; for example, the winking of the eyes when an object approaches, moving when tickled, etc. These actions are contrasted in physiology and psychology with "voluntary actions," those which owe part of their stimulus at least to central processes. Reflex actions are regular, definite, beyond control, inherited, and presided over by the lower centers of the brain and spinal cord.

Reforma'tion, historical name for the religious movement of the sixteenth century, which divided the Latin Catholic Church. There were many "reformers before the Reformation," and almost every doctrine of Luther had its advocates long before him. The invention of printing and the revival of letters and classical learning led up to the religious upheaval of the sixteenth century. From the Protestant standpoint the Reformation asserted the principle of evangelical freedom as laid down in the Epistles of Paul to the Romans and Galatians, in opposition to the system of authority which held the individual conscience and private judgment bound. From this general principle proceed the two fundamental doctrines of Protestantism—the absolute supremacy of the word of Christ and the absolute supremacy of the grace of Christ. The other fundamental doctrine of the Reformation is that the sinner is justified before God—*i.e.*, acquitted of guilt and declared righteous—solely on the ground of the all-sufficient merit of Christ as apprehended by a living faith; in opposition to the theory, then prevalent and substantially sanctioned by the Council of Trent, which makes faith and good works the two coördinate sources of justification. To these two must be added the doctrine of the universal priesthood of believers, and the right and duty of the laity not only to read the Bible in the vernacular tongue, but also to take part in the government and all the public affairs of the Church.

The Reformation in Germany, directed by Luther and Melanchthon, began in the Univ. of Wittenberg with the protest against the traffic in indulgences, October 31, 1517, and soon became a powerful popular movement. Luther at first shrank from the idea of separation, but the course of events brought him into irreconcilable conflict with the central authority of the Church. Pope Leo X, June, 1520, pronounced the sentence of excommunication against him. The Diet of Worms, 1521, where Luther made his memorable defense, added to the excommunication of the pope the ban of the emperor. The Reformation spread in spite of these decrees, and gained a foothold before 1530 in the greater part of N. Germany. The Second Diet of Spire, 1529, prohibited its further progress. Against this decree of the Catholic majority the evangelical princes entered the protest, April 19, 1529, which gave rise to the name of Protestants. Their principal standard, the "Augsburg Confession of Faith," was presented to the Diet of Augsburg, 1530. The Peace of Augsburg, 1555, secured to the Lutheran states the free exercise of their re-

ligion, but with a restriction on its further progress. Many German Protestants followed Calvin's lead in preference to Luther's, and formed the German Reformed Church, which, 1562, adopted the Heidelberg catechism as its confession of faith. The sixteenth century, with the violent internal controversies of the Lutheran Church, and the contests between that body and the Calvinists, closes the theological history of the German Reformation; but its political history was not brought to a final termination until after the Thirty Years' War, by the Treaty of Westphalia, 1648.

The Reformation in Switzerland was independent of the German Reformation, and resulted in the formation of the Reformed communion as distinct from the Lutheran. It agreed with it in all the essential principles and doctrines except that of the eucharist, but departed further from the received traditions in government and discipline, and aimed at a more radical moral and practical reformation of the people. Zwingli began it by preaching against various abuses at Einsiedeln, 1516, and then with more energy and effect at Zurich, 1519, where, 1526, the mass was abolished and a simple mode of worship was established. The Reformation was soon introduced in the majority of the cantons, but not without bloodshed. The Catholics routed the small army of Zurichers in the battle of Cappel, October, 1531, where Zwingli met his death. John Calvin, a Frenchman by birth and education, but exiled from his native land for his faith, found a new home, 1536, in Geneva. His theological writings, especially the "Institutes" and "Commentaries," exerted a formative influence on all Reformed churches and confessions of faith; while his legislative genius developed the presbyterian form of government.

Nearly all the early reformers of France had to seek safety abroad. Calvin and Beza may be called the fathers of the French Reformed Church. Their pupils returned as missionaries to their native land. The first Protestant congregation was formed at Paris, 1555, and the first synod held there, 1559. The movement unavoidably assumed a political character. The Protestant (or Huguenot) party was numerically weaker, but contained some of the noblest blood and best talent of France, and was supported by the house of Navarre. Three civil wars followed in rapid succession, when the court and the Duke of Guise resorted to treason, and concerted a wholesale slaughter of the Huguenots, carried out on August 24, 1572. (See BARTHOLOMEW, SAINT, MASSACRE OF, and HUGUENOTS.) The Protestant Prince Henry of Navarre, 1589, became King of France as Henry IV. He abjured the Protestant faith, 1593, saying that Paris and the peace of France were "worth a mass"; but he secured to his former associates the right of the free exercise of religion by the Edict of Nantes, 1598. The revocation of this edict by Louis XIV, 1685, made the French Reformed Church a "church of the desert"; yet it survived the most cruel persecutions at home, and enriched by many thousands of exiles every Protestant country.

The Reformation in the Netherlands was kindled mostly by Reformed and Calvinistic influences from Switzerland and France. The Duke of Alva, according to Grotius, destroyed the lives of 100,000 Dutch Protestants during the six years of his governorship (1567–73). Finally the seven N. provinces formed a federal republic, and accomplished their severance from the Church of Rome and the Spanish crown. The first Dutch Reformed synod was held at Dort, 1574. The Protestantism of Holland has always been predominantly Calvinistic, although the Arminians, or Remonstrants, through the writings of their distinguished scholars and divines, have exerted a great influence.

In Hungary the Reformation was introduced by disciples of Luther and Melanchthon who had studied at Wittenberg after 1524. In Poland the movement was started by fugitive Bohemian Brethren and the writings of the German reformers. Gustavus Vasa favored Protestantism from political and mercenary motives, and monastic property was confiscated; the whole country, including the bishops, followed without much difficulty. Both Sweden and Denmark adopted the Lutheran creed, and retained the episcopal form of government in the closest union with the state. From Denmark the Reformation passed over to Norway abt. 1536.

English Protestantism was from the start a political as well as a religious movement. In the English Reformation five periods are distinguished. The first, 1527–47, witnessed the abolition of the authority of the Roman papacy under Henry VIII. The second embraces the reign of Edward VI, 1547–53. Cranmer was assisted in the work of introducing the Reformation by Ridley and Latimer, and by several Reformed divines from the Continent, especially Martin Bucer, of Strassburg, and Peter Martyr, of Zurich. The most important works of this period are the forty-two articles of religion (subsequently reduced to thirty-nine), being a new and moderately Calvinistic confession of faith, and the "Book of Common Prayer." The third period is the reign of Queen Mary, 1553–58, during which Catholic persecution consolidated the Reformation. The fourth period is the permanent establishment of the Anglican Reformation during the reign of Elizabeth, 1558–1603. The Anglican Church as established by her was semi-Catholic in its form of prelatical and liturgical worship government. But while the Catholic party was almost annihilated in England, the Puritan party grew more powerful under the successors of Elizabeth, and overthrew the dynasty of the Stuarts. These troubles and agitations constitute the fifth period in the history of English Protestantism.

Reformed' Church in the Uni'ted States, ecclesiastical body formerly known as the German Reformed Church, derived from the Reformed churches of Switzerland and Germany. Churches were founded in N. America early in the eighteenth century (the first being at Philadelphia, 1727), and finally extended into isolated settlements as far as S. Carolina. In 1747 Michael Schlatter established the Coetus, a synod in all respects, except that its decis-

ions had to be approved by the synods of Holland. In 1793 the Coetus became independent; 1824 the Classis of W. Pennsylvania resolved itself into the Synod of Ohio; 1863 the two existing synods united in the organization of a general synod. The theological seminary at Lancaster, at one time located in Mercersburg, gave its name to a system of teaching known as "Mercersburg theology." In 1906 the Church had 1,214 ministers, 1,738 churches, 279,483 communicants.

Reformed Church of Amer'ica, religious denomination known prior to 1867 as the Reformed Protestant Dutch Church in North America. The first church organization founded in N. America was that of New Amsterdam (New York). The emigration from Holland followed the Raritan, Hudson, and Mohawk rivers and their affluents, and at first was considerable, but after the English conquest, 1664, fell off rapidly. It numbered, 1906, 658 churches, 715 ministers, and 119,355 communicants. The main strength of the denomination is in the E. states. The Church owns five creeds — the Apostles', Nicene (so called), Athanasian, Belgic Confession, and the Canons of Dordrecht. It requires the Heidelberg catechism to be taught in families and schools, and also to be regularly explained from the pulpit on the Lord's Day. There is a liturgy, which is mostly optional, but the forms for the administration of the sacraments, of ordination, and of church discipline are of imperative obligation. The affairs of each congregation are managed by a consistory of elders and deacons.

Reformed Church of Scot'land. See SCOTLAND, CHURCH OF.

Reformed Epis'copal Church, religious body founded December 2, 1873, by a few clergymen and laymen who left the Protestant Episcopal Church of the U. S. under the leadership of the Rt. Rev. George David Cummins, D.D. Unwilling longer to share responsibility for what he believed to be the Romeward tendencies of that Church, he resigned his bishopric in it, and was chosen the first presiding bishop of the new church. The Church adheres to episcopacy not as a divine right, but as a very ancient and desirable form of church polity; it condemns as contrary to God's word the doctrines that the Church of Christ exists only in one order or form of ecclesiastical polity; that Christian ministers are priests in another sense than that in which all believers are a royal priesthood; that the Lord's table is an altar on which the body and blood of Christ is offered anew to the Father; that the presence of Christ in the Lord's Supper is a presence in the elements of bread and wine; that regeneration is inseparably connected with baptism.

At its Third General Council at Chicago, 1875, it adopted its articles of religion, based substantially on the Thirty-nine Articles of the Church of England. The Reformed Episcopal Church is governed by a general council, its president being the presiding bishop for the time being.

This church was also planted in England, 1877. In 1883 its churches were given a separate and independent existence under the title of the General Synod of Great Britain and Ireland. This body, 1894, was merged with the "Reformed Church of England" under the name of "The Reformed Episcopal Church in the United Kingdom of Great Britain and Ireland," otherwise called "The Reformed Church of England." It has some twenty regular organizations. In the U. S. (1906) there were 82 ministers, 74 churches, 9,419 communicants, and a well-endowed theological school.

Reformed Presbyte'rians, religious body in Scotland and the U. S., often called Covenanters or Cameronians, originating 1680. They hold that a church member may not take an oath of allegiance to any government that fails to acknowledge the kingly authority of Christ, nor vote for any officer who must take such an oath. A reformed presbytery was organized in N. America, 1774. In 1782 it united with the Associate Presbyteries of Pennsylvania and New York. Hence arose the Reformed and Associate Reformed Presbyterians now existing.

Refrac'tion of Light. See LIGHT.

Refrig'erants, term sometimes used in medicine to designate collectively certain medicines given in fever. Such are cooling drinks in general—solutions of potassium salts, as the citrate or nitrate; effervescing draughts, acid mixtures, and solutions of purgative salts.

Refrigera'tion, production of artificial cold by machinery to reduce the temperature of buildings below that of their natural surroundings for preservative purposes. The processes consist in the application of heat through the medium of steam to cause a series of operations with one of the following substances: Air, sulphuric ether, methylic ether, sulphur dioxide, chymogene, a distillate of petroleum; carbonic acid; anhydrous ammonia, the substance most extensively employed in commercial refrigeration, and water. The first six of these substances are available for refrigerating purposes only by means of what is termed the compression system, but the last two may be utilized either by a compression system or the absorption system. The apparatus of the compressive system consists of a gas compressing pump, driven by any form of steam engine, connected with a nest of pipe, kept drenched or surrounded with cold water at about 60° F., constituting the condenser. A closed tank connecting with the outlet from the condenser constitutes the liquid ammonia reservoir. A nest of pipe immersed in a bath of brine or other fluid, noncongealable at the lowest desired temperature, constitutes the cooler. One end of this nest of pipe connects with the reservoir by means of a valve, termed the expansion cock, and the other end connects with the inlet, or suction end, of the compressing pump. The cold-storage chambers or rooms have insulated walls, and a low temperature is maintained by circulating cold brine through the nest pipe. This is accomplished by means of the brine pump, which draws brine from the bottom of the bath and forces it through the brine pipes, whence it returns to the top of the bath, or brine tank.

The operation of the apparatus is as follows: The expansion cock being closed, a tank of liquid anhydrous ammonia is connected so as to discharge into the cooler, and the compressing pump is operated so as to prevent the accumulation of more than the desired pressure —say 19 lb. above the atmosphere—in the cooler. The liquid anhydrous ammonia can exist as a liquid at 70° F. only when it is under a pressure of about 115 lb. per square inch above the atmosphere. The ammonia therefore flows from the tank into the cooler; but in the latter the pressure is only 19 lb., and at this pressure the ammonia cannot exist as a liquid unless its temperature is about 5° F., which is the boiling point corresponding to the pressure. Hence, as its temperature on entering the cooler is about 70°, it is in the condition of a liquid heated above the boiling point due to its pressure. Vaporization will therefore occur until the latent heat of the portion vaporized equals the heat represented by the difference between 70° and 5°, when the ammonia will have cooled itself to the latter temperature. About ten per cent of the weight of ammonia will have vaporized as a consequence of the fall of temperature. Ninety per cent of the ammonia is therefore in the liquid state when it has attained the temperature of ebullition corresponding to the pressure existing in the cooler, and if no heat could be supplied from surrounding bodies it would remain liquid; but it is practically in direct contact with the brine, whose temperature is so much higher than that of the ammonia that the latter must receive heat from the brine, and, as the compression pump by its suction prevents the pressure in the cooler from increasing, the effect of the heat received will be to evaporate the liquid ammonia without increasing its temperature. The brine may therefore be cooled by an amount equivalent to the latent heat of 90 per cent of the total ammonia introduced into the cooler.

When the desired brine temperature is reached its circulation through the cold-storage rooms is commenced. Generally the brine returns to the tank after passing through the storage rooms, at about 6° higher temperature than that at which it leaves the tank, and its mean temperature is from 6° to 16° higher than the boiling point of the ammonia corresponding to the suction pressure, according to the efficiency and extent of the pipe surface in the brine tank. The mean temperature of the brine is about 6° less than that of the storage space required to be cooled. For the storage of beer a temperature of about 36° F. is required, and this is therefore afforded with a pressure of about 28 lb. above the atmosphere in the cooler. Slaughter houses require about 25° F. in their storage rooms, which may be afforded by about 24 lb. suction or cooler pressure; while for the storage of fish, requiring a temperature of about 0° F., a suction pressure of about 5 lb. above the atmosphere must be used. See FREEZING; ICE.

Refrigeration of the Earth, gradual cooling of the earth in the course of ages. According to the nebular hypothesis, the earth was originally a mass of fiery liquid. The fact that the temperature increases from the surface inward implies that there is a continual loss of heat from the interior by gradual conduction through the outer crust and atmosphere to external space. The loss is very small, in proportion, compared with that of the sun—owing, doubtless, to the existence of the crust. Lord Kelvin assumes that at a certain critical epoch a superficial layer of rocks became solidified, at a temperature of about 7,000° F.; shows that it is probable that the amount of heat of the crust went on diminishing by a quantity proportional to the square root of the time from the epoch; and believes that the earth is not, as is commonly supposed, a mass of fiery liquid covered with a crust of from 30 to 100 m. thick, but on the whole more rigid than a solid globe of glass, or even of steel, of the same dimensions.

Ref'uge, Cit'ies of. See CITIES OF REFUGE.

Regaldi (rā-gäl'dē), **Giuseppe,** 1809–83; Italian poet; b. Novara; was an improvisatore, 1833–56, and was received with honor in the chief cities of Italy, and in France, Switzerland, and Germany; Prof. of History, Lyceum of Parma, 1860; in Univ. of Cagliari, 1862; in Univ. of Bologna after 1866; published a number of volumes of verse, a book of travels, and a collection of essays.

Regat'ta. See ROWING.

Regela'tion, freezing together, without the application of outward cold, of contiguous surfaces (of ice or of certain other solids at the melting point) when subjected to pressure and then released. This phenomenon, discovered by Faraday, 1850, and common to all substances which increase in volume upon freezing, has been studied chiefly in the case of ice, a material in which the process is of interest on account of the part which it plays in the motion of glaciers. When two ice blocks in contact are subjected to pressure, a slight lowering of the melting point occurs and a certain amount of ice is liquefied. To convert ice into the liquid form, even without rise of temperature, requires, however, a large amount of heat. This is obtained at the expense of the temperature of the liquid and of the surrounding ice masses, which are thus brought below the normal melting point. As soon as the pressure is removed, freezing takes place and the adjacent surfaces of the two blocks are united. See FREEZING; ICE.

Regenera'tion, theological term used to express the initial stage of the change experienced by one who enters the Christian life. It is derived from the New Testament, where the "new birth" (I Peter i, 3, 23; Titus iii, 5; John iii, 3 f.) is the beginning of that "renewal" which produces the "new creature." In the history of theology the term has been used with varying latitude of meaning. Among the Jews it was employed in an external sense to express the change of relation which took place when a heathen became a Jew; from them it was adopted in this sense by many of the Fathers, and is still so used by many advocates of "baptismal regeneration." It is used in the Latin Church to express the whole real change

which corresponds to this external change of relation. The Reformers separated justification by itself as something wrought on, not in, the sinner, and employed regeneration to express the whole process of inner renovation in all its stages. In the development of Protestant theology the term has been still further narrowed; first, to express the opening stage of this subjective work as distinguished from its continuance in sanctification; and then, since the seventeenth century, to express the initial divine act in this opening stage itself, as distinguished from the broader term conversion, which includes, along with the act of God, revivifying man; also, the act of man in turning to God.

Re'gensburg. See RATISBON.

Re'gent Bird, name given to one of the bower birds (*Sericulus melinus*), in honor of the prince regent, afterward George IV, because the black and golden yellow plumage of the male represented his family colors; inhabitant of New S. Wales.

Reggio di Calabria (rād'jō dē kä-lä'brē-ä), ancient *Rhegium, Regium,* city of Italy; province of Reggio; on the Strait of Messina; a handsome city, with attractive suburbs, a few manufactories, and a small maritime trade; founded by Chalcidians before 723 B.C.; a republic till about the end of the fifth century; became subject to Rome; successively captured by Alaric; Totila, King of the Goths, 549; the Saracens, 918; Pisans, 1005; Robert Guiscard, 1060, and the Ottomans, 1552, 1597; nevertheless, was flourishing when, 1783, it was overthrown by an earthquake. Was again devastated by an earthquake in 1908, with enormous loss of life. Pop. (1901) 44,415.

Reggio nell' Emilia (nĕl-lä-mē'lē-ä), ancient, *Rhegium Lepidi,* city of Italy, province of same name; on railway between Parma and Modena; is a walled town, with broad streets, many lined with arcades; contains a cathedral, theater, library, academy of fine arts, and museum. The small house in which Ariosto was born is still seen. The asylum for the insane, outside the town, is one of the best-managed philanthropic establishments in Italy. Reggio was captured by the Goths, 409; oppressed by the exarchs of Ravenna, rebuilt by Charlemagne in the ninth century; an independent commonwealth in the twelfth century. For several hundred years it was generally ruled by the Este and Austro-Este family, and joined the modern Kingdom of Italy, 1859. It carries on a large trade in country products, and has manufactures of carriages, brooms, leather, and sailcloth. Pop. of commune (1901) 58,490.

Regil'lus, Lake, small body of water in Latium, now generally supposed to be identical with the lake of Cornufelle; about 10 m. SE. of Rome, near Frascati (the ancient Tusculum), which was drained in the seventeenth century. Here, abt. 498 B.C., according to the Roman legends, Tarquin the Proud gave battle to the Romans under the dictator Albinus Postumius, was wounded and utterly defeated, and fled alone from the field. The chiefs on both sides were nearly all killed or wounded. The victory of the Romans was attributed to the sudden appearance of Castor and Pollux at the head of their cavalry.

Reg'iment, military organization made up of one or more battalions of infantry, squadrons of cavalry, or batteries of artillery. Regiments are generally designated by numbers; but they frequently have special names, derived from the locality of their enlistment or from some marked service rendered by them. The regiment is commanded by a colonel, or in his absence by its lieutenant colonel. Each battalion is commanded by a major and each company by a captain. The regimental staff usually consists of an adjutant, quartermaster, commissary, and surgeon. Some regiments have also a chaplain. The regiment is the administrative unit of the army, the battalion the tactical unit, and the company the unit of combat.

Regi'na, former capital of Assiniboia district and the NW. territories of Canada; now capital of province of Saskatchewan (proclaimed 1905); on Canadian Pacific Railway; 356 m. W. of Winnipeg; contains government offices, headquarters of NW. Mounted Police, Anglican, Baptist, Methodist, Presbyterian, and Roman Catholic churches, and flour and grist mills. An Indian industrial school is near the city. Pop. (1911) 30,213.

Reg'ulus, Marcus Atilius, Roman military officer; belonged to an old plebeian family; consul 267 and 256 B.C. In latter year Regulus and his colleague, Manlius, transferred the Punic War from Sicily to Africa, where Regulus achieved great successes against the Carthaginians. Fortune turned, however, when Xanthippus, a Lacedæmonian general, was put at the head of the Carthaginian army. Regulus was defeated, his army nearly destroyed, and he himself was taken prisoner.

Rehobo'am, son and successor of Solomon. His mother was Naamah, an Ammonite princess (I Kings xiv, 21, 31). His accession, abt. 975 B.C. (Usher) or 990 B.C. (Hales), was the signal for the revolt of the ten tribes and the dismemberment of the kingdom (I Kings xii). He died at the age of fifty-eight, after a reign of seventeen years.

Reho'both, name of the three biblical sites: (1) In Genesis x, 11, one of the four Assyrian cities founded by Asshur, or, perhaps, one of the four parts of the "great city" Nineveh. (2) In Genesis xxvi, 22, a well dug by Isaac, recently identified with an ancient well, now filled up, in the Wady er-Ruhaibeh, about 20 m. S. of Beersheba. (3) In Genesis xxxvi, 37, the city of an early Edomite king named Saul, described as being "by the river"—*i.e.,* the Euphrates; identified with Rachaba, on the E. side of the Euphrates and 4 m. from it.

Reichstadt (rīch'stät), **Duke of.** See NAPOLEON II.

Reid (rēd), **Mayne,** 1818–83; British author; b. Ireland; removed to U. S., 1838; traveled through most of the states; settled in Philadelphia, where he devoted himself to lit-

ture; was a U. S. volunteer in the Mexican War; abt. 1849 settled in London; voluminous and popular writer, chiefly of romances of American adventure; chief books, "The Rifle Rangers," "The Scalp Hunters," "The White Chief," "The Quadroon," "The Castaways," "The Yellow Chief," etc.

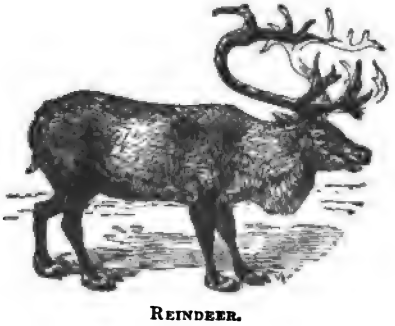
Reid, Samuel Chester, 1783–1861; American naval officer; b. Norwich, Conn.; commanded the privateer brig *General Armstrong* in a two days' engagement with the boats of three British men-of-war in the port of Fayal, 1814, and repulsed the attack. The violation of neutral waters by the British led to a prolonged diplomatic controversy, finally decided by Louis Napoleon as arbitrator, adversely to the American complaint. Capt. Reid was the designer of the present U. S. flag.

Reid, Thomas, 1710–96; Scottish philosopher; b. Strachan; became minister at New Machar, Aberdeen, 1737; Prof. of Philosophy, King's College, Aberdeen, 1752; succeeded Adam Smith as Prof. of Moral Philosophy at Glasgow Univ., 1763; resigned, 1781, to devote himself to philosophical studies; was originally a disciple of Berkeley, but, 1740, was roused to independent speculation by David Hume's "Treatise upon Human Nature"; chief works, "Inquiry into the Human Mind on the Principle of Common Sense," "Essays on the Intellectual Powers of Man," "Essays on the Active Powers of Man." On the Scottish school of philosophy, and more especially the study of psychology, he exercised a powerful influence.

Reign of Ter'ror, name given to that period of the French Revolution which lasted from January 21, 1793, the day of the execution of Louis XVI, till July 27 (9 Thermidor), 1794, when Robespierre was guillotined and the Committee of Safety broken up. See FRENCH REVOLUTION.

Reims. See RHEIMS.

Reindeer (rān'dēr), species of deer (*Tarandus rangifer*) found in the N. portions of both the Old and New World, and known in N. America as the caribou. The animal stands 3½



REINDEER.

to 4 ft. high at the shoulders, and is more heavily built than other species of deer. The antlers are large, spreading, somewhat irregular in shape; small antlers are present in the female. The feet are wide-spreading and well adapted for progress over hard snow. The general color in winter is light gray, lighter on the neck, white beneath; in summer, somewhat redder. Reindeer feed on the shoots and twigs of trees, and on various lichens and moss. The animal has long been domesticated in Scandinavia and Siberia, where it is kept in herds and used as a beast of burden, besides furnishing food and clothing. The U. S. Govt., 1891, began the introduction into Alaska of the Siberian reindeer.

Reindeer Moss (*Cladonia rangiferina*), a lichen most abundant in Arctic regions, where it forms the principal winter food of the reindeer. It is of a silvery-white color, even in summer. It is also used as an article of human food after having been boiled in reindeer's milk. It contains the nutritious lichenine, a form of starch. In the U. S. it abounds in damp woods under evergreens in all the Atlantic states down to Florida.

Reinick (rī'nĭk), **Robert,** 1805–52; German poet; b. Danzig; studied painting in Berlin under Düsseldorf; went to Italy, 1838; finally settled in Dresden; has high rank among German lyric poets; works include "Songs for German Artists," "Songs and Fables for the Young."

Reis Effendi (rīs ĕf-fĕn'dĭ), Turkish, "presiding effendi"; originally, chief secretary of the Divan of the Sublime Porte; directly under the grand vizier; was medium of communication between the government and the representatives of foreign powers. The office was abolished by Sultan Mahmud II, and its place was taken by a minister of foreign affairs (Charijiyyah Nasiri). Since then this minister has been appointed by an irade of the sultan.

Reiske (rīs'kĕ), **Johann Jacob,** 1716–74; German Hellenist; b. Zörbig, Saxony; rector of the Nicolai Gymnasium, Leipzig, 1758–74; one of Germany's greatest Greek scholars; most celebrated works include editions, commentaries, and translations of Plutarch, Dionysius of Halicarnassus, "Oratores Græci," Theocritus.

Réjane (rā-zhän'), stage name of GABRIELLE RÉJU, 1857– ; French actress; b. Paris; made her début at vaudeville in "Revue des Deux Mondes," 1875; joined company at the Théâtre des Variétés, 1882; passed to L'Ambigu to create the part of *La Glu*; subsequently at the Palais Royal, Odéon, Grand Théâtre, etc., created leading parts in "Ma Camarade," "Germinie Lacerteux," "Ma Cousine," "Madame Sans Gêne," "La Passerelle," etc. In 1895 she made a tour of the U. S.; married, 1892, M. Porel, director of the Grand Théâtre.

Relaps'ing Fe'ver, also known as FAMINE FEVER, and, technically, as FEBRIS RECURRENS, a specific infectious and contagious disease due to the action of a microörganism, the *Spirochæta obermeieri*, which flourishes in the blood. It occurs only at intervals of some years, and generally during seasons of privation and insalubrity, attacking chiefly the lower classes, ill fed and housed. Its onset is sudden, with an abrupt and severe rigor and sense of extreme weakness. The temperature

rapidly ascends, and during four or five days remains 105°, 106°, 107°, 108° F.—an unusual fever heat unaccompanied by brain symptoms or danger of death. The fever and extreme depression last from five to seven days, when a sudden abatement and rapid convalescence set in. Appetite and strength are slowly returning, and the invalid is about, when, on the fourteenth day from the first attack, he is seized by a second or relapse resembling the first. Very rarely, a third, a fourth, and even a fifth, relapse occurs. The mortality is not as high as in typhus fever, nor as great as the severe symptoms would indicate.

Relativ'ity, principle in psychology according to which all mental states are influenced by preceding and accompanying conditions of consciousness. The principle was formerly a theoretical doctrine of philosophy, and was discussed in all early English philosophy under the phrase "relativity of knowledge." The development of the doctrine is due mainly to Stuart Mill and Sir William Hamilton.

Release', in law, the extinguishment of a pre-existing right. It may consist in an agreement on a legal consideration, or in a sealed contract, or it may result from the acts of the parties or from the operation of law. While there is much authority for the statement that an obligation under seal can be released only by a contract under seal, the better modern view is that a release on a legal consideration is equally effective in extinguishing an obligation with the common-law release under seal. The voluntary destruction of an obligation, or its surrender by the obligee to the obligor, with the intention of discharging the latter, will operate as a release. A contract for personal services is terminated by the death of either party. At common law the death of a joint contractor extinguished the obligation so far as he or his estate was concerned. Likewise the release of one joint obligor worked the legal release of his coöbligors, and the release by one joint obligee was binding on his co-obligees.

Relief'. See ALTO-RILIEVO; BAS-RELIEF, or BASSO-RILIEVO.

Relief Pres'bytery, or **Relief Church**, name of the body of Presbyterians in Scotland which joined with the United Secession Church to form the United Presbyterian Church.

Reli'gion, Compar'ative, the comparative study of myths, dogmas, forms of worship, and all other phenomena of religion. Religions are classed according to their genealogy and according to their degree of development or morphology.

The conclusion that all Aryan faiths have sprung from one primitive old Aryan religion is supported by the fact that by nearly all the Indo-European or Aryan nations the supreme God was called by the same name (Dynans, Zeus, Jupiter, etc.), that the original unity of conception of many similar deities is proved by the derivation of their names from the same root, and that the same general name for "god" was used. Among Semitic peoples the same conclusion holds good: Ilu, El, Ilâh are generally used for "god," and such divine titles as Baal, Bel, Adon, Malek, etc., are common. The science of language is an indispensable aid to the study of the relationship of myths, dogmas, and forms of worship.

The characteristic of a group of religions is their idea of the relation between God and the world, between God and man, and of the manner in which the deity chooses to be worshiped. In the Aryan group there is a kinship between God and man: the deity is the father of gods and men, the protector of the human race and of the same nature with it, though higher and mightier. This form is called theanthropic. In the Semitic religions the eminence of God above man is emphasized, the Semites venerating their gods as lords and kings whose obedient servants—nay, slaves—they are. Such religions are called theocratic. Among theonthropic religions are the Vardic religion in India, the religion of the ancient Iranians, Medes, and Persians, the religion of ancient Greece and of the Romans, and the Germanic and the Celtic religions. Judaism and Mohammedanism are examples of theocratic religions.

Other groups of religions exist. Such are the "patriarchal" religions, in which the divine beings worshiped as "elders, old ones, grandparents" are mutually related in the same way as the heads of different tribes or families. To these belong the religions of the Finns, Lapps, and perhaps also some of the religions of N. American nations. Another type is found in the Chinese religions, in which the human spirits form a middle class between the heavenly and the earthly.

Religions may be also divided into nature religions and ethical religions. In nature religions the highest divinities, be they spirits, fetishes, or manlike beings, are mighty powers of nature, connected in some way with a definite natural object or phenomenon. From these religions the ethical element is by no means excluded. On the contrary, from the remotest times moral qualities have been attributed to the gods or have been deified themselves. The ethical element, however, remains subjected to the nature gods, and the latter are by no means bound by it. As soon as man has become conscious of the superiority of the spirit to the body and of his relative independence, animism arises, with spiritism and fetichism. Gradually from the multitude of demons a number of select ones come to be looked upon as superior in rank and even in kind; these become gods, and the other spirits are but their servants.

The ethical religions have to be distinguished into at least two principal categories: (1) Law religions, whose sacred writings, at least part of them, are framed like laws, as the Chinese Confucianism, the religions of the Brahmanical and Jaina sects, primitive Buddhism, Mazdeism, Mosaism, and Judaism; (2) those which are based upon more or less broadly conceived, universally human principles, and which might be called missionary religions, *viz.*, Islamism, the younger Buddhism, and Christianity. The

first-named are, as a rule, confined to a definite nationality, for even if they try to spread among other nations, the alien proselytes are never regarded as the equals of the native adherents. The last named have more or less completely relinquished the principle of nationality, and consider all believers as equals, whatever may be their language or their nationality. Hence the two categories might also be called *particularistic* and *universalistic* ethical religions. See GOD; THEOLOGY.

Reli'gious Or'ders, term applied to associations of men or women in the Roman Catholic Church and the Oriental churches whose members live in common in convents. That which distinguishes them from other associations is retirement from the world, celibacy, and their organization by means of religious vows into communities of an entirely ecclesiastical character. The official list in the "Gerarchia Cattolica," published in the Vatican, divides religious orders into six classes: (1) The regular canons; (2) regular clerks, embracing Theatins, Barnabites, Jesuits, and Piarists; (3) religious congregations, including the Passionists and Redemptorists; (4) ecclesiastical congregations, including the Lazarists, Oblates of Mary Immaculate, Brothers of the Christian Schools, and Brothers of Mercy; (5) monks, including the Benedictines, Camaldules, Cistercians, Trappists, Mekhitarists or Armenian Benedictines, and Basilians; (6) mendicants, including the Dominicans, minor Observants, minor Conventuals, minor Capuchins, third order of St. Francis, Augustinians, Carmelites, Hieronymites or order of St. Jerome, and hospitallers of St. John of God. To most of the religious orders, soon after their formation, nuns of the same rule attached themselves. Besides the nuns, most of the orders received numerous additions by admitting lay brothers (*fratres conversi*) or lay sisters (*sorores conversæ*), who were charged with the performance of the housework and with keeping up communication with the world. Protestant churches in general are opposed to monastic institutions, but in recent years several have established sisterhoods and deaconesses for educational and charitable work.

Remain'der, in law, an interest in that which remains of a whole estate, after a partial or particular estate, which was reserved out of the whole, has been determined. Thus, if a man who is seized in fee of lands grant them to A for twenty years, and after that term has expired to B and his heirs forever, A is tenant for years and B has remainder in fee. Remainders are either vested or contingent. They are vested when there is an immediate right of present enjoyment, or a present fixed right of future enjoyment. By the definition of the New York statute (which Chancellor Kent commended), a remainder is contingent while the person to whom or the event on which it is limited to take effect remains uncertain. The common law doctrine of remainders is essentially unaltered in most of the states, but in New York material changes have been made by statute.

Rem'brandt Van Ryn (rīn), **Paul Harmens,** 1607–69; Dutch painter; b. Leyden; studied in Leyden and Amsterdam, and abt. 1623 fitted up a studio in his father's windmill on the bank of the Rhine. In 1628 he executed his first great work, a portrait of his mother, and, 1630, settled in Amsterdam. His paintings and etchings, exhibiting the most powerful effects of light and shade, brought great prices, and he taught a large number of pupils. He preferred the imitation of vulgar nature to the cultivation of ideal beauty, and his manner depends on the elaboration of a single element in art, that of chiaroscuro. Among his historical pictures are "The Sacrifice of Abraham," "The Woman Taken in Adultery," and "The Descent from the Cross," and his portraits include "The Jew Merchant" and the "Night Watch." His peculiar style is perhaps most strikingly displayed in his etchings, especially in his "Christ Healing the Sick." He executed over 600 paintings, now variously valued at from $500 to $20,000 each.

Reményi (rĕm'ĭn-yē), **Edouard,** 1830–98; Hungarian violinist; b. Heves; studied at the Vienna Conservatory, 1842–45, under Bohm; took part in the Austrian insurrection, 1848, and was compelled to fly; made concert tour in the U. S. and in European capitals, 1849–50; returned to Hungary, 1860; played in Paris, 1865 and 1875; in London, 1877–78; in the U. S., 1878, 1887, and 1893. Died in San Francisco, Cal.

Remit'tent Fe'ver. See FEVER.

Remon'strants, name by which the adherents of Arminius were designated when, 1610, they addressed a remonstrance (*remonstrantia*) to the states of the province of Holland. Their adversaries, the adherents of Gomarus, answered with a counter remonstrance, and were called Contra-Remonstrants, but both designations later fell out of use.

Re'mus. See ROMULUS.

Rémusat (rā-mū-zā'), **Claire Elisabeth Jeanne Gravier de Vergennes** (Comtesse de), 1780–1821; French essayist; b. Paris; became wife of chamberlain of Napoleon I and attendant of Empress Josephine; chiefly known for her "Memoirs," unfavorable to Napoleon.

Rémusat, Jean Pierre Abel, 1788–1832; French Orientalist; b. Paris; studied medicine, but devoted himself principally to study of Asiatic languages, especially Chinese; appointed, 1814, Prof. of Chinese at Collège de France, a chair established especially for him; principal works, "Researches in Tartar Languages," "Elements of Chinese Grammar," "Asiatic Miscellanies," numerous translations from the Chinese and Tibetan languages, besides minor essays in scientific periodicals.

Remy (rē-mē'), **Saint,** abt. 439–533; apostle of the Franks; elected Bishop of Rheims in his twenty-second year; baptized Clovis, founder of the French monarchy, 496; with the king's aid spread a knowledge of Christianity among the people; established bishops in cities of Tournay, Laon, Arras, Thérouanne, and Cambrai; day, October 1st.

Renaissance (English, rē-nās'sāns; French, rē-nā-sāñs'), term applied to a great advance in learning or in the study and pursuit of literature, fine art, etc., and especially to the revival of learning in the fifteenth century, beginning in Italy, and to the change in most departments of thought which accompanied it. The term is also used as an adjective, as Renaissance designing, Renaissance sculpture. The Renaissance ("new birth") in literature was marked by an enthusiastic study of the classics, the issuing of editions of Greek and Latin authors, the gathering by rich patrons of letters, of libraries, and collections of antiquities, and the assembling at their courts by popes and princes of *humanists*, or adepts in the newly revived learning, as the surest means of obtaining name and fame for themselves. Florence became a nursery of Greek scholars; Petrarch and Boccaccio became the models of the succeeding generations. Italian humanism did not influence France to any appreciable extent until the sixteenth century.

Spain began to feel the influence early in the fifteenth century. Holland, beginning with Erasmus, 1465–1536, produced a long line of great humanists. The new culture arose in England at the end of the fifteenth century, in Linacre and Grocyn, who taught at Oxford; Italian and humanistic influences prevailed in literature during the Elizabethan age, and throughout the seventeenth century the tendencies were all essentially classical, though few great scholars besides Milton appeared. In Germany some traces of interest in the new studies are visible in the fourteenth century, but it was not until the councils of Constance, 1414–18, in which several Italian scholars played important parts, that the Germans had an opportunity of seeing what humanism really was. In the S. the philological investigations of the humanists centered about the classical writings; in the N. they were often utilized to secure a new and better understanding of the Bible. Melanchthon also wielded a great power for classical progress. From the middle of the sixteenth century, for two hundred years, humanism held almost undisputed control of higher education in Germany.

The art of sculpture in Europe had been developed in connection with Gothic architecture to great excellence in the thirteenth century, but in Italy in that century there began a much closer study of those remains of ancient Roman work which had never been wholly neglected, and also some renewed influence from Constantinople is to be presumed. The sculptures of the Pisanos, Arnolfo di Cambio, and others show a classical feeling. Early in the fourteenth century the works of Giotto gave evidences of independence and a combined realism and skill, and later Andrea Pisano and Orcagna did remarkable work ahead of its time. Those artists were thinking out for themselves the great question why the antique sarcophagi and the Greco-Roman engraved gems showed an art so much more learned and complete than theirs, and the Renaissance in fine art was well under way before the painters and sculptors began to be influenced by the restorers of classical learning.

Before 1425, when the new wisdom and power in fine art had been triumphantly established, Masaccio, Lorenzo Ghiberti, Donatello, and others had executed works much in advance of their time and sometimes modern in conception. The year 1475 is the central point in the century of greatest artistic achievement of the Italian Renaissance, excluding the Venetian painters, for Venice was hardly an Italian city. After 1525 the decline was rapid. The period 1475–1525 is made illustrious by such names as Raphael, Perugino, Botticelli, Gozzoli, Verocchio, Mantegna, the Pollajuolos, among the painters. Michelangelo's long career begins with the central year of the Renaissance, and Leonardo da Vinci, painter, architect, sculptor, also belongs to this period. The descriptive term Renaissance hardly applies to the work of the painters and sculptors elsewhere than in Italy. The art work in France, Spain, Belgium, Germany, Holland, and England is rather a continuation of the mediæval schools of those countries until long after the Renaissance had run its course in Italy.

Brunelleschi (1379–1446) was the master of the movement toward a classical revival in architecture. Gothic architecture in Italy had been more or less of a foreign style, and in the fourteenth century it was not followed closely by the Venetians, the Florentines, etc. There appears to have been a gradual transition from the Gothic, as the Italians understood it, to a kind of design which was classical in feeling and made up of classical details, but not without a certain mediæval freedom. To Brunelleschi, and to his great rivals, Michelozzi, Alberti, Pietro Lombardo, and Fra Giocondo, are due such graceful or simple unimitative designs as the dome of the cathedral of Florence, the Pitti palace, Florence, the Church of the Madonna dei Miracoli, Venice, and the stretch of the Procuratie Vecchio on the N. side of St. Mark's Square, Venice, and the Palazzo del Consiglio at Verona. The Italian Renaissance in architecture passed away, with all its charm and variety, with the sixteenth century, or with the second decade of it.

In France, at the time of the accession of Louis XII (1498) there was a spirit of longing after the classic splendors of Italy. In that year or the next work was begun on the new château of Amboise, and the designs for the lost château of Gaillon must have been under consideration as early as 1500. The establishment of the new style was delayed because an old one, the late Gothic, was firmly entrenched. The time of the early Renaissance in France, and of its final dawn in Germany and England, is a time of fatigued and self-conscious decay in Italy, induced by war and political decline, but partly due, also, to the substitution of a style of architecture made up of rules and fixed measurements for the fresh inspirations of the earlier time. By 1535, when the Renaissance in Italy may be said to have made its farewell, the introduction of classical details had hardly begun in Germany and England. The full charm of the Renaissance continued in France under Francis

I and Henry II, 1515–59. The style of Henry IV is not included in that epoch by French writers. It was not, however, until the middle of the seventeenth century that the formal Roman style finally replaced the French Renaissance. From that time the Roman style prevailed, even in E. Germany and England. Attempts at a reaction were made under Louis XVI, and a new spirit of refined and delicate design is seen in buildings, furniture, and ornaments, but the revolution put an end to this. See ARCHITECTURE; PAINTING; SCULPTURE.

Renan (rē-nän'), **Joseph Ernest**, 1823–92; French philologist and historian; b. Tréquier, Brittany; entered the Seminary of Saint Sulpice, Paris, to study for the Church, but, his beliefs having changed, renounced the priesthood and devoted himself to private teaching and study; was twice honored by the Institute, 1848; appointed to the MS. department, Bibliothèque Nationale, 1851; succeeded Thierry in Académie des Inscriptions, 1856; appointed to chair of Hebrew, Collège de France, 1862; was removed, 1863, after appearance of his "Life of Jesus." He was reappointed 1870; chosen to the Academy, 1878; after 1873 was administrator of the Collège de France. Works include "General History of the Semitic Languages," "The Origins of Christianity," "The Christian Church," "Saint Paul," "The Evangelists," "History of the People of Israel," "Moral and Critical Essays," "Caliban," and other philosophical dramas.

René (rē-nā') **I** (surnamed THE GOOD), Count of Provence, Duke of Anjou, 1409–80; titular King of Naples; b. Angers; son of Louis of Anjou and Yolande of Aragon; married Isabella of Lorraine; claimed that duchy on death of father-in-law; opposed, captured, and imprisoned by Count of Vaudemont; received at death of brother Provence, Anjou, Naples, Sicily, and Jerusalem; bought liberty and acknowledgment of right to Lorraine; defeated by King of Aragon in Naples; later devoted himself to family estates; encouraged agriculture, manufactures, literature, and art; at death most of his possessions fell to the French crown.

Re'ni, Guido. See GUIDO RENI.

Ren'nell, James, 1742–1830; English geographer; b. near Chudleigh, Devon; early entered the navy, from which he passed to service of the East India Company; was for thirteen years employed in the surveys of Bengal, and the results of his work were included in the first approximately correct map of India; returned to England, 1786, and devoted many years with his pen to laborious elucidation of geography, giving special attention to India, Africa, ocean currents, and ancient geography.

Rennes (rĕn), formerly capital of Brittany, now capital of department of Ille-et-Vilaine, France; at confluence of the Ille and Vilaine; 234 m. WSW. of Paris; consists of two parts—an upper or new town, of an elegant and modern appearance, and a lower or old part, mostly built of wood, with narrow and winding streets; these are connected by four bridges; manufactures sailcloth, linen, lace, and embroideries, and has a large trade in honey, wax, butter, and poultry. Pop. (1906) 75,640.

Ren'net. See CHEESE.

Ren'nie, Sir John, 1794–1874; English civil engineer; b. London; son of an engineer; assisted his father on Southwark and Waterloo bridges; completed new London bridge, Sheerness dockyard, Ramsgate harbor, and Plymouth breakwater, all begun by his father; designed and built Whitehaven and Cardiff docks; with his brother GEORGE (1791–1866), designed and erected machinery for mints of Bombay, Calcutta, and Mexico; considered the highest authority on all subjects connected with hydraulic engineering, harbors, canals, irrigation, storage of water, and the management of rivers.

Rent, in law, as defined by Blackstone, "a certain profit issuing yearly out of lands and tenements corporeal." In its original meaning in English law the term involved no notion of a money payment, but signified a right vested in the feudal lord to exact of his tenant certain military or other services as the price and condition of his tenure. These services were, in process of time, commuted into money values, and were discharged by the payment of stipulated sums of money, or of other property. In this sense of the term, rent, or the right to exact services, or the money value of services, from another, is itself a species of property. It is treated by the common law as belonging to the class of incorporeal interests in land akin to easements and profits. In the U. S. the term is commonly used to denote the sum paid by a tenant for years, or at will, to his landlord as compensation for the possession and use of the leased premises. In Pennsylvania a variety of rent charge is still in use under the name of ground rent—that is, when the grantor of land in fee reserves a perpetual pecuniary rent to himself and his heirs. It was an attempt to enforce rents of this sort which had been long deemed obsolete that brought about the "antirent" disturbance in E. New York, 1839–47. In other states a ground rent is simply the rent reserved by the lessor in a building lease, or one wherein the lessee covenants to erect a building on the land, and which is therefore given in most instances for a considerable term of years.

Repeat'ing Cir'cle, astronomical instrument of observation; involves the principle of repeating an angle several times continuously along its graduated limb, which consists of an entire circle.

Reph'aim, people whom biblical tradition supposes to have inhabited parts of Palestine prior to the invasion of the Hebrews (Gen. xv, 20; Josh. xvii, 15). They are represented as living around Bashan (Deut. iii, 11, 13) and in the country of the Ammonites (Deut. ii, 19, 20). A valley of the Rephaim is mentioned (Josh. xv, 8) which has been identified with the valley Bak'a, S. of Jerusalem. In Deuteronomy ii, 11, the Emim are said to belong to Rephaim. The Rephaim are probably identical

with the children of Rapha (a supposititious ancestor), mentioned 2 Samuel xxi and 1 Chronicle xx, who with the children of Anak were regarded as giants by the popular fancy. The same name is given to the shades of the nether world (Ps. lxxxviii, 11; Is. xxvi, 14), who dwell in Sheol (Prov. ix, 18; xxi, 16) and under the waters of the sea (Job xxvi, 5). At the last judgment the earth will give them forth again (Is. xxvi, 19).

Reph'idim, locality in the Sinaitic peninsula, where the Israelites under Moses and Joshua gained a great victory over the Amalekites (Ex. xvii, 8 *seq.*). Its identification depends on that of Sinai, in whose immediate neighborhood it was. If Serbal was the mountain of law, Rephidim must have been in the wady Feiran. If Sufsafeh was the mountain—which can hardly be questioned—Rephidim must have been in the wady es-Sheikh, at the pass called el-Watiyeh.

Replev'in, ancient common-law form of action brought to recover the possession of specific goods unlawfully taken by the defendant and belonging to the plaintiff, or to which the latter has present right of possession. Originally, as still in England (where the action is mostly used to recover goods unlawfully distrained for rent), replevin could be brought only to recover goods unlawfully taken and detained; but in most of the states of the U. S. the scope of the action has been enlarged so that it lies to recover all specific goods unlawfully detained, regardless of the manner of taking. In some states this action as such has been abolished, and a suit similar in its features, its objects, and its relief has been provided for by statute.

Repoussé (rē-pō-sā'), French term for the art of producing reliefs, and even rounded forms, in metal by beating thin plates from behind. The metals employed are those that by their malleability lend themselves most easily to the work—gold and silver, brass, copper, tin, and lead. This is a very ancient art; the Egyptians, Cypriotes, and Etruscans practiced it, and specimens of their skill in the art are preserved. In the Middle Ages it was widely employed both in Europe and in the East, and it has continued in use down to our own times. In Italy, France, Great Britain, and the U. S. much repoussé work is now produced, and, so far as mechanical excellence is concerned, American smiths are not behind the rest of the world. The results produced by this process are superficially similar to those attained by casting, but the effects are more artistic and free, and in the best work, whether of semibarbarous or of civilized peoples, there is more individuality expressed than any casting could give.

Representa'tion, in politics, the method of transmitting the will of the people into law or action by means of a few persons chosen by the people. The term first came into general political use among the Germanic nations, and has had its fullest development in Great Britain and the U. S. The representative system, however, is found fully developed in nearly all civilized modern states, whether republics, as France and Switzerland, or monarchies, as Germany, Austria, Italy. In the monarchies usually some check is placed on the representative body by an hereditary or appointed upper house, as in Great Britain and Germany, and sometimes the monarch even is able to exert much power in this direction.

Generally speaking, in the U. S., France, the German Empire, and in other countries, the constituencies are divided territorially, each representative being voted for by all classes of voters resident in his district. A system of class constituencies is in vogue, however, in some countries. In local representative bodies in Austria members are elected by the great landed estates, by the most highly taxed industries and trades, by the towns and markets, by the rural communes, by boards of commerce, or trade guilds. Somewhat similar constituencies are found in rural local government in Prussia. Even in England constituencies have been so divided as to separate cities from the rural districts, and economic conditions have divided constituencies in practice even more accurately than that. In most countries members of representative bodies are elected each in a single territorial district, or when elected in larger districts, as earlier in France by the *scrutin de liste*, all members of each party are put on the same ticket, so that the majority of voters are likely to secure all the representatives and to leave the minority unrepresented. Inasmuch as laws are passed by a majority vote of the representatives elected, it often happens that representatives of but little more than one fourth the voters pass laws. In Switzerland, where bills passed may, on petition, be submitted to the people, it has happened more than once that a bill passed by a small majority in the legislature has been rejected on the referendum by nearly a three-fourths vote, thus proving that the majority of the legislature was not in harmony with the people.

To remedy these evils various plans for securing proportional representation to minorities have been proposed: (1) The "limited vote." Under the English Reform Act of 1867 this plan was adopted as follows: "At a contested election for a county or borough represented by three members, no person shall vote for more than two candidates." So in New York, in selecting members at large for the Constitutional Convention of 1867, no voter was allowed more than sixteen votes, there being thirty-two members to be chosen. A similar plan has worked well in Pennsylvania in choosing judges for the Supreme Court, county commissioners, county auditors, and inspectors of elections. (2) The "free vote" is applied in Illinois in the election of members of the lower house of the legislature. Each qualified voter may cast as many votes for one candidate as there are representatives to be elected, or may distribute the same among the candidates.

(3) The "Hare system," sometimes called the Andrae system because it was introduced by Andrae into Denmark before Hare proposed it in England. Under this system the quotient

obtained by dividing the total number of votes cast by the number of places to be filled gives the quota needed to elect a candidate. Each voter casts a ballot containing the names of as many candidates as he pleases, the names numbered in the order of his preference. As the ballots are taken from the box each is credited to the name indicated as first choice. If the electoral quota has already been secured for this first name, the ballot is credited to the second choice, and so on till all the full quotas have been ascertained. The largest fraction of quotas then elect. (4) The "free-list" system is in use in four cantons of Switzerland—Ticino, Neuchâtel, Geneva, Zug. Under it any body of voters large enough to be entitled to nominate candidates may nominate as many as it sees fit up to the whole number of places to be filled. In the election each voter may cast as many votes as there are members to be elected, distributing them as he will among the candidates, but casting no more than one vote for any candidate. The quota of representation is found by dividing the total vote cast by the number of places to be filled. The total vote cast by each party divided by this quota gives the number of representatives to which each party is entitled. Should there not be enough full quotas to elect the whole number, the required number shall be filled from those parties having the largest fractional quotas. See LEGISLATURE.

Represent'ative Gov'ernment. See DEMOCRACY; GOVERNMENT.

Reproduc'tion, in biology, that phenomenon in which a portion of any animal or any plant separates from the rest and eventually develops into a form essentially similar to that which gave it origin. Reproduction is of two kinds, sexual and asexual. Sexual reproduction in its simplest expression merely calls for the union of two separate cells as a prerequisite for the formation of new individuals. Asexual reproduction is accomplished without such union of sexual cells. Most of the various modifications of the process may be arranged in two categories—fission and budding. In fission the organism directly divides into two or more distinct individuals. Sometimes the division is incomplete, the new individuals remaining connected to a greater or less extent, and thus "colonies," as among the corals, may result. In budding, found in animals only in the lower forms, a small portion of the organism is differentiated, and this, whether detached or remaining connected with the parent, subsequently becomes developed into the original form. REPRODUCTION, in plants, the processes by which plants perpetuate their kind. In single-celled plants every cell is capable of producing new plants. The same is true of some few-celled plants. Broadly speaking, there are two general ways by which plants are reproduced. In the first, a cell or a mass of cells may become detached and grow into a new plant. The case is essentially the same where true buds and even branches separate from the parent plant, as in the bulblets in the axils of the leaves of some lilies, and in the inflorescences of some onions, the runners of strawberries, the trailing runnerlike stems of buffalo grass, the tubers of many plants, as the potato, and perhaps the spontaneously deciduous twigs of cottonwoods and some willows. In all these cases the essential feature is the separation from the parent plant of one or more living cells, which continue to grow, eventually producing a plant like the parent. In marked contrast to the foregoing are the various modifications of the sexual reproductive process, in which the essential feature is the union of two cells in the formation of the first cell of the new plant. In the simplest cases two apparently similar cells fuse into one, but as we pass to higher plants there is an increasing difference between the cells concerned; moreover, while in the simpler cases the fusion appears to involve the whole of each cell, in the higher plants it is confined to the nuclei. See CROSS FERTILIZATION; FERTILIZATION OF PLANTS; BIOGENESIS; EMBRYOLOGY; GENERATION, SPONTANEOUS; SEXUAL SELECTION.

Rep'tiles, class of vertebrated animals intermediate between fishes and birds. The number of species is about 2,000, or less than that of mammals or birds; most of them are terrestrial, but some (as the dragons) can sustain themselves in the air like the flying squirrels, and the extinct pterodactyl probably winged its way like the bats; some live habitually in the water, swimming by means of flattened fins (as the turtles), or by a laterally compressed tail (as in crocodilians); the amphisbæna and other ophisaurians dwell in subterranean burrows. They present every degree of speed, from the agility of the lizard to the slowness of the tortoise; some are fitted for running over dry sand, others for climbing trees, others for ascending smooth surfaces; the limbs are not generally adapted for rapid or graceful motions, being short, almost at right angles with the spine, and hardly raising the body during locomotion enough to prevent it from dragging on the ground; the anterior limbs are the shortest, and the knees and elbows are constantly flexed and far apart longitudinally; the feet are not adapted for prehension (the chameleon excepted), so that they display little skill in preparing retreats for themselves or places for their eggs.

They are naturally cold blooded, and are found in greatest abundance and of largest size in warm climates; under the influence of cold they pass into a lethargic state, and a similar condition befalls the S. American crocodilians during the hottest season of the equatorial regions. The tortoise and the crocodile are sufficiently protected against ordinary enemies; the lizard darts into its hole; the great boas prevail over every foe but man; many serpents are armed with poisonous fangs, rarely used, however, except on the defensive; some are covered with bristling spines, like the horned lizards, and are thus saved from predaceous animals. They are of great use to man in destroying noxious insects and other animals; some, like the tortoises, furnish food, and others supply various articles useful in

the arts. They are preyed on by carnivorous birds, as eagles, storks, cranes, and the ibis, and by such mammals as the ichneumon, the hog, and the smaller carnivora; they are themselves essentially carnivorous, and feed on living prey, which they swallow whole, but the marine turtles are principally herbivorous. See HERPETOLOGY.

Repub'lic, political community in which the sovereign power is lodged in the whole body of the people or in a portion of them, and exercised through representatives elected by them. It is an *aristocratic* republic when the exercise of the sovereign power is confined to a privileged class; a *democratic* republic when all classes of the people participate in the exercise of that power. Of the republics of ancient Greece, Sparta had a strictly aristocratic government, while Athens might have been called a democratic republic but for the circumstance that a majority of its population were slaves without political rights. The republic of Rome was, during the first centuries of its existence, aristocratic, but in the course of time the lower orders of the people, the *plebs*, gained access to the high offices; but a large part of the population remained slaves without political rights. The Italian republics —notably Venice and Genoa—were strictly aristocratic; a number of patrician families, who chose from among themselves the head of the government, called the doge, enjoyed a monopoly of political power.

The first important republic of the modern era, the United Netherlands—formed after their separation from Spain, 1580—was of a more democratic tendency, as was also the English republic or "commonwealth" which, after an existence of only eleven years (1649–60), was overthrown by the restoration of the Stuart dynasty. Of a similar character were most of the free cities and Hanse towns of Germany. Two miniature republics in the S. of Europe have survived to our day—San Marino, in Italy, and Andorra, in the Pyrenees—remarkable mainly for their insignificance as independent states. At present there are only two republics of importance in Europe—Switzerland and France. The French constitution is not unlike the English constitution, with the substitution of an elective president for the sovereign and an elective senate for the House of Lords. In America all states except the colonial possessions of European powers are republics with democratic institutions. The Republic of the U. S. presents the realization of the democratic republican idea on the greatest scale.

The constitution of a republic may be (1) such as to make the general government in its legislative and executive capacity the depository of the whole sovereignty of the people, so as to give it control not only of national affairs, but also of local administration; or (2) the general government of a republic may be one of strictly limited powers, being confined in its constitutional sphere of action to a certain class of things which concern the nation as a whole, while the administration of affairs of a local nature is left to the "self-government" of the people in their local organizations respectively, with entire independence of the central authority; or (3) these two systems may be so mixed as to leave to the local self-government of the people only a limited range, subject to supervision and interference by the central government. A government of the first description would be called a *centralized*, of the second a *decentralized* government, and of the third either one or the other as it more nearly approaches the first or the second standard. The French Republic presents an illustration of the centralized system in a but slightly modified sense, while the *federal* republics—as the U. S.—exemplify that which combines the independent administration of local interests by the people in their local organizations with a central government controlling affairs of national concern.

For the system of centralization the advantage is claimed that it imparts to the government great power, energy, and rapidity of action by enabling it to employ the whole machinery of general and local administration for its purposes. It is therefore by many thought preferable in a country whose surroundings and international relations are such as to render the possibility of an instantaneous employment of all its resources desirable, or whose internal peace is threatened by a lawless and turbulent spirit, so as to require prompt and vigorous measures for the maintenance of order and security. But while the centralized system thus creates, in the common acceptation of the term, a "strong government," which may be used for good ends, it produces at the same time an accumulation of power which may become, and sometimes has shown itself, very dangerous to popular liberty and to the permanency of republican institutions. The centralized system holds out a tempting prize to popular insurrection at the seat of government, as well as to the *coup d'état* on the part of those in power; and what appears as an element of strength and energy in the government becomes thereby in reality an element of instability. This tendency is the more dangerous as the centralized system fosters among the people the habit of looking for all that is to be done for their interests not to themselves, but to the superior wisdom of those directing the machinery of power. It is essential to the success of democratic republican government that the political intelligence of the masses of the people be well developed, and this the centralized system fails to bring about.

Repub'lican Par'ty, one of the two great political parties in the U. S. Historically it is the successor of the Federalist and Whig parties, and it was born of the antislavery movement which began with the Abolitionists, who were unable to form as effective political force. The mass of the Whigs inclined naturally to opposition to slavery, but the Whig Party had a strong minority in the slave states. This minority could not throw the party upon the side of slavery, but it could and did prevent the Whig organization from becoming an avowed antislavery party. The

first expressions of the antislavery movement, in a national way, were in the Free Soil and Liberty parties, both outside the two great parties, and only polling a small vote. The antislavery vote defeated Clay in 1844, and gave New York to the Whigs in 1848. Even after this the Whigs, accepting the compromise of 1850, still refused to take up opposition to slavery, and the elections of 1852 were disastrous to them.

It is generally admitted now that the first formal adoption of the name Republican was made by the Michigan State Convention early in June, 1854, and that it was due to a suggestion in a letter from Horace Greeley. Certain it is that the name spread rapidly, and was adopted by state conventions in Maine, Ohio, Indiana, Illinois, Wisconsin, and Iowa. The new party principle prevailed in the N. states, and wherever the Republicans ran a straight ticket they carried everything before them. The first convention of the new party met at Pittsburg on February 22, 1856. A national organization was there formed, and a call issued for another convention to nominate candidates for President and Vice President. This second convention met in Philadelphia on June 17th. The platform declared against the establishment of slavery in the territories, and the third resolution, which has become in political literature a familiar quotation, ran as follows: "Resolved, That the Constitution confers upon Congress sovereign power over the territories of the U. S. for their government; and that in the exercise of this power it is both the right and the imperative duty of Congress to prohibit in the territories those twin relics of barbarism, polygamy and slavery." The fourth resolution discussed at length the condition of Kansas, and denounced the Democratic administration for their policy in that territory. The fifth resolution demanded the admission of Kansas; the sixth assailed the doctrines of the Ostend circular. The seventh and eighth resolutions declared in favor of national aid for a railway to the Pacific coast, and also for liberal appropriations for rivers and harbors. The convention named as its candidates John C. Frémont, of California, and William L. Dayton, of New Jersey. The Democratic candidate, James Buchanan, was elected, but the Republicans carried every N. state except Pennsylvania, New Jersey, Indiana, Illinois, and California, and gave their ticket 114 electoral votes. Of the popular vote the Republicans polled 1,341,264.

When the National Republican Convention assembled in Chicago, on May 16, 1860, the contest for the Republican nomination was both sharp and determined. The first choice of a majority of Republicans was William H. Seward, of New York, to whom the E. states were especially devoted. He had, however, many active enemies. These men, led by Horace Greeley, united with the W. candidate, and thus defeated Seward and secured the nomination of Lincoln. The West having received the presidency, the convention nominated Hannibal Hamlin, of Maine, for Vice President. The platform of 1860 recognized the rights of states in regard to their domestic institutions, but denounced the threats of secession which then filled the air. It took the old ground with renewed strength in regard to Kansas and the extension of slavery to the territories, demanded the admission of Kansas as a state, and declared the reopening of the slave trade to be a crime. The resolutions also reiterated the declaration of 1856 as to internal improvements. The twelfth clause was as follows: "That, while providing revenue for the support of the general government by duties upon imports, sound policy requires such an adjustment of these imposts as to encourage the development of the industrial interests of the whole country; and we commend that policy of national exchanges which secures to the workingmen liberal wages, to agriculture remunerating prices, to mechanics and manufacturers an adequate reward for their skill, labor, and enterprise, and to the nation commercial prosperity and independence." The result of the election of 1860 was the election of Lincoln by a large majority in the electoral college and a large plurality of the popular vote. The figures stood as follows: Lincoln, 1,857,610; Douglas, 1,291,574; Breckinridge, 850,082; Bell, 646,124. The electoral vote: Lincoln, 180; Breckinridge, 72; Bell, 39; and Douglas, 12. Since the first election of Lincoln the Republican Party has been victorious in the presidential elections of 1864 (Lincoln), 1868 (Grant), 1872 (Grant), 1876 (Hayes; decided by Electoral Commission), 1880 (Garfield), 1888 (Harrison), 1896 (McKinley), 1900 (McKinley), 1904 (Roosevelt), 1908 (Taft). In 1912 a schism in the ranks of the party led to the formation of the Progressive Party and contributed to the severe defeat of that year, when the Republican candidate (Taft), representing the conservative wing, carried only two states.

Broadly speaking, the Republican Party is the exponent of two principles: (1) the application of the protective principle in framing tariffs (see PROTECTION); (2) a "loose construction" of the Constitution conferring on the National Government greater power than would be possible under a strict construction.

Resaca de la Palma (rā-sä'kä dā lä päl'mä), ravine in S. Texas, 4 m. N. of Matamoros, Mexico. After his victory at Palo Alto (May 8, 1846), Gen. Taylor, with 2,200 troops, pursued the Mexicans (4,000 to 5,000, commanded by Arista) to this place; on the 9th he attacked and completely defeated them.

Rescis'sion, in law, a vacating or making void; annulment; abrogation; in the law of contracts, the annulling or vacating of a contract so that it can no longer be enforced between the parties unless it is renewed by mutual consent.

Res'ervoir, in engineering, a lake or basin for holding water fitted with appliances for regulating the outflow of water at different rates from the inflow, thus enabling either a more or less regular supply to be distributed at irregular intervals of time or an irregular supply to be distributed at a uniform rate,

Of the first class are what are termed *storage reservoirs*, which are generally constructed on the course of a stream by the erection of a dam. Enormous reservoirs of this kind were constructed in India and in Egypt at periods antedating any historical records, and many of them are still used for their original purpose of making agriculture possible in regions where the seasons of rainfall and of the growing crops are separated by a considerable interval of time, while of many others traces alone remain. One of modern construction at Assouan on the Nile, completed 1902, contains 1,395,150,000 cubic yds. of water, equivalent to a lake 45 sq. m. in area. In India there remain traces of the Poonairy reservoir, which by the construction of 30 m. of dams flooded 40,000 acres of land, and the Veeranum reservoir, which flooded 22,000 acres. The great Mudduk Masoor reservoir in India, constructed in the fifteenth century, was 108 ft. deep, flooded 26,000 acres, and held 280,000 million gal. In the island of Ceylon there is an ancient reservoir covering an area of 10,000 acres. In India there are many thousand smaller ones of more recent date. In Madras alone there are 50,000. In the nineteenth century the largest were built by the British in India for storing water for irrigation, and several of considerable size have been constructed in California and New Mexico for the same purpose. A number of large reservoirs have been built in Spain, also for irrigation.

In the rest of Europe and in the E. portion of the U. S. the principal purpose for which storage reservoirs have been constructed is the supply of water to cities. Among the largest of these are the Vyrnwy for Liverpool, containing 11,900 million gal.; the Vehar for Bombay, containing 10,800 million gal.; the San Mateo for San Francisco, holding 31,000 million gal.; the Yan Yean for Melbourne, Australia, 6,400 million gal.; and the Ashokan, for New York City, 128,000 million gal.

For the immediate daily demands of cities *service reservoirs* are required, and their capacity need not be much in excess of a single day's supply. They are generally located as near the center of distribution as practicable, and the water furnished to them by gravity from storage reservoirs or by pumping from the source of supply. Wherever possible, they are constructed on a summit by excavating sufficient material to make an embankment around the pit. The largest reservoir of this type is in Central Park, New York City, and covers 96 acres and contains 1,200 million gal. In many cases of small supply in flat regions service reservoirs are iron tanks or stand pipes from 5 to 40 ft. in diameter and 50 to 250 ft. in height.

Reshid Pasha (rē-shēd' pä-shä'), MUSTAPHA MEHEMET, 1802–58; Turkish statesman; b. Constantinople; early entered Ottoman civil service; ambassador in Paris at death of Mahmud II, 1839; at once recalled and appointed Minister of Foreign Affairs; had an important share in drawing up the Hatt-i-sherif of Gulhane—a sort of constitutional charter—wherein the sultan accorded many rights and privileges to his Christian subjects; forced to resign, 1841; grand vizier, 1846–52; recalled to office on outbreak of Crimean War, 1853. During that struggle he was hardly more than the tool of Lord Stratford de Redcliffe, the British ambassador, and on close of war was superseded. British influence caused his restoration, but his influence entirely waned before his death.

Resht, town of Persia; capital of province of Gilan; chief entrepôt for the trade in silk, large quantities of which are sent from here to Russia and Turkey. Its port on the Caspian Sea is Enzelli, 16 m. distant. Pop. (1900) 40,000.

Res'ins, class of bodies that occur very widely distributed in plants mostly together with volatile oils, dissolved in which they frequently flow from trees accidentally or intentionally cut. Crude resins are never crystallized, but have the form of drops, like gum. They are generally colored yellow. Resins are used for preparing varnishes, sealing wax, soap, for stiffening hat bodies, etc. The most important are amber, copal, dammar, dragon's blood, mastic, lac, rosin (or colophony), and sandarach. See also GUM RESINS.

Resolu'tion of For'ces, mathematical separation of forces into component parts; the converse of composition of forces.

Resor'cin, or Resor'cinol, diatomic phenol prepared on the large scale by the action of caustic soda on benzene-disulphonic acid; soluble in water, alcohol, and ether, and used for preparing fluorescein, eosin, and other phthalic acid colors.

Respira'tion, the special function of the lungs, the process which has for its ultimate object the supplying of red blood globules with oxygen for transmission to the various parts of the body. In abdominal breathing the muscles of the abdomen by contraction force the viscera upward against the diaphragm, which becomes arched into the thoracic cavity and forces the air out of the lungs. Then the diaphragm, contracting, pushes the abdominal viscera downward, and thereby makes room for entrance of inspiratory air. In the thoracic type of breathing various external muscles elevate the ribs and sternum, and thus materially increase the chest capacity, causing inspiration. This completed, the weight of the chest walls, with the assistance of certain muscles, causes descent of the sternum and ribs, and, in conjunction with the natural contractility of the lung substance, forces the air out. The abdominal type of breathing is predominant in men, the thoracic in women.

Respiratory action of the lungs is involuntary, although it may be voluntarily modified. From eighteen to twenty respiratory acts take place per minute, at each of which an average of about 26 cu. in. of air is inspired and expired. The air which ebbs and flows is *tidal air*. In addition, 100 cu. in. of *residual air*, unaffected by respiratory movement, remains in the lungs. Expired air contains carbonic-acid gas, which is exhaled and removed from

the body. Each inspiratory act, therefore, adds an increment of oxygen to the bulk of air in the lungs; this oxygen, by the law of diffusion of gases, permeates the residual air and reaches the air sacs. The air sacs are thin-walled; indeed, their walls are essentially a network of capillary vessels held together by a film of elastic tissue. The walls of the innumerable air sacs constitute a surface of many hundred square feet, upon which the delicate network of blood vessels is spread. The pulmonary artery brings impure or venous blood to this surface, carbonic-acid gas is exchanged for oxygen, and the purified oxygenated blood is returned by the pulmonary vein to the left side of the heart, thence to be propelled through the entire circulation by the red blood globules, which are the carriers of oxygen.

Resuscitation or artificial respiration is used in suspended animation from suffocation, as in drowning and hanging, also from vapor of chloroform or other noxious gases, in which, death occurring from exclusion of air, a supply of air to the lungs is the one remedy. First, *drain off water from chest and stomach* (*in cases of drowning*) by placing the patient face downward, the pit of the stomach being raised above the level of the mouth by a large roll of clothing beneath the body. Throw your weight forcibly two or three times, for a moment or two, upon the back, over the roll, so as to press all fluids out of the mouth.

Sylvester's method is the most generally applicable. The body being placed upon the back, with the head slightly elevated, the flexed arms, grasped just above the elbows, are carried outward and upward from the chest almost perpendicularly, and retained in their position for about two seconds. They are then lowered and brought closely to the sides of the chest, against which they are firmly pressed for the same length of time, in order to expel the air as during the act of expiration. These alternate movements of elevation and depression are repeated from twelve to fourteen times a minute, and are performed with all possible gentleness. *Fell's method* of direct artificial respiration is applicable especially to opium poisoning or other forms of narcosis. A tube is inserted into the larynx and trachea and warmed air forced in by a bellows. By this method persons apparently dead have been resuscitated. Mouth-to-mouth insufflation, in children especially, is easily practicable and very useful.

The length of time persons have been under water, or have remained apparently dead after leaving the water, and yet been resuscitated, is uncertain. The reported time is so remarkably long in some cases as to justify efforts for resuscitation for at least an hour, the patient having breathed within half an hour or perhaps an hour.

Res'pirators, mouth pieces of fine gauze and cloth, worn by persons with diseased or weak lungs to prevent the ingress of cold and damp air or foreign matter, as smoke, dust, or the grit of stone. They are little used in the U. S., but are much employed in Great Britain, especially by grinders and stone carvers.

Respir'atory Sounds. See AUSCULTATION.

Responden'tia, maritime loan made on the hypothecation of a ship's cargo or some part thereof. It is a written contract and frequently in the form of a bond. Unless a specific lien on the goods is stipulated for, the respondentia obligation is a personal one of the borrower. Where such a lien is created it gives no claim to the lender in case the goods are lost; for it is the essence of this form of loan that the principal and interest are hazarded on the safe arrival of the cargo.

Rest Cure, term by which medical writers designate a plan of treatment first systematized by Dr. S. Weir Mitchell. It is useful in the treatment of neurasthenia and hysteria. The patient is kept at rest in bed, the diet is regulated, milk generally forming the principal element, and the muscles and circulation are kept in a healthy condition by massage.

Restora'tionists, Christians, of whatever sect, who entertain the belief that the wicked who die in an impenitent state will, after suitable punishment and repentance, be restored to divine favor. The first who taught this doctrine was Origen, and it seems to have spread widely in the E. It was condemned by the Council of Constantinople, 543, and in the W. it found no adherents. In the Middle Ages it was held by the Brethren of the Free Spirit, in the Reformation by the Anabaptists, in the eighteenth century by the Rationalists, and always by the Universalists.

Restraint' of Trade, Con'tracts in, term technically used to designate those contracts which impose such hindrance or obstruction to the free and uninterrupted pursuit of trade and business as to conflict with public policy, and for that reason to be illegal and void, although the term has a wider general meaning, making it applicable to any contract which hinders or interferes with freedom of trade, whether to such a degree as to render it illegal or not. A contract in restraint of trade may exercise such restraint either in restricting the territory within which the business or occupation may be carried on by one or more parties to the contract, or it may entirely restrain one or more parties from pursuing a given occupation or occupations. A certain degree of hindrance or impairment of freedom of trade may be imposed in a contract without rendering the contract invalid as against public policy, so that, generally speaking, such restraint may be imposed as is necessary to afford a fair protection to the interests of the one in whose favor the restraint is imposed. Whatever restraint is imposed beyond the needs of such protection becomes void, so that restraining covenants must be limited in regard to the territory to which they apply.

Certain contracts, such as those for the sale of secret processes of manufacture which it is agreed shall be communicated for the exclusive use of the buyer, or the sale of a patent right for the life of the patent, may impose an unlimited restraint of time and place; and, generally speaking, where the restraint imposed is reasonably limited as to

space, it may be imposed without limit as to the duration of time. Where, however, no space limit is imposed, but the prohibition or restraint becomes general, the duration or length of time for which the restraint is to continue may be void. Contracts illegal because in restraint of trade most frequently are those involving the sale of a good-will of the firm or business concern to those intending to operate the same trade, or business, or calling within the same territory as that in which the vendor previously operated it.

A form of contract involving illegal restraint of trade which is very common and of great commercial importance are those intended to establish a monopoly or form a combination of the capital or goods of two or more persons or corporations in such a way as to restrict trade or to prevent competition in the sale of commodities.

Resurrec'tion, future general raising of the bodies of the dead by the power of God; a doctrine peculiarly of revelation. Hints of it appear in the Brahmanic and Stoical theories of "returning cycles," the "great year" of Plato, and the Egyptian mysteries. It was definitely taught by the Zoroastrians; is implied, alluded to, or foretold in the Old Testament (Job xix, 26; Ps. xvi, 10; xlix, 15; lxviii, 18; Isa. xxvi, 19; lxvi, 24; Ezek. xxxvii; Hos. xiii, 14; Dan. xii, 2); was believed by most of the later Jews; appears in the Apocrypha (Wisd. iii, 7; 2 Macc. vii, 9, 14, 23, 29); was a formal doctrine of the Pharisees, but was disputed by the Sadducees; was clearly revealed in the New Testament by Christ and the apostles; has been accepted by all parts and ages of the Church; and is a prominent doctrine of Mohammedanism. The resurrection of Christ is treated as the fountain, type, and power of a new life—the corner stone of the Christian system, without which everything falls. It is related closely to every doctrine, and has always been a chief point of attack. It is part of the antidote of the fall, from which, under the covenant of grace, the whole of human nature is to be redeemed and united to Christ. It gives dignity to the body which was created by God, redeemed by Christ, and is the "temple" and organ of the Holy Spirit. It gives hope and comfort—relief, in part, from the terror of death. The doctrine, held by some, of two resurrections at different times—one of the righteous, to which the New Testament specially refers, and the other of the wicked—rests on (1) the declaration, Revelations xx, 5, 6; (2) the use of the phrase "resurrection *from* the dead," used fifty times, and always referring to the good; the phrase "*of* the dead," referring to the bad; (3) on the New Testament distinctions concerning the resurrection of the just and unjust, the resurrection to life or condemnation; (4) the longing of the apostle to attain the first; and (5) on the order given, 1 Corinthians xv, 23. See FUTURE STATE; IMMORTALITY; SOUL.

Resurrection Plant, popular name of several plants which, after drying, on the application of moisture expand again. One of these is the Rose of Jericho, of the E. Mediterranean region. Another common one is *Selaginella lepidophylla*, a lycopod of the family *Selaginellaceæ*, a native of Mexico and Central America. It is a branching plant, covering a space on the ground from 5 to 8 in. in diameter. When dry it rolls up into a dull grayish ball, but on the return of moisture it expands again into a beautiful green rosette.

Resuscita'tion. See RESPIRATION.

Retain'ing Wall, wall of stone built to sustain banks of earth in position. The lateral pressure of the earth depends on its nature and upon the inclination of the wall. The thickness of the wall at the top will be usually 2 ft. or more, and its thickness at the base is to be so determined that ample security against sliding, rotating, and crushing will be secured. The last of these is liable to occur only in very high walls, and the first can be always avoided by inclining the joints backward. The cross section of the wall is usually trapezoidal, but walls with curved front surfaces are occasionally built. Retaining walls should be furnished with holes to permit drainage, and the top of the back should be arranged so that the frost may not exert a heavy lateral thrust.

Reten'tion of U'rine. See URINE.

Rethel (rā'tĕl), **Alfred**, 1816–59; German painter; b. Aix-la-Chapelle; studied at Düsseldorf and at Frankfort; visited Italy in 1844–45; painted after his return four great frescoes representing incidents in the history of Charlemagne in the city hall of his native city, and produced several grand designs—"Hannibal Crossing the Alps," "Dance of Death," etc.

Ret'ina. See EYE.

Retrograda'tion, in astronomy, an apparent or real motion of a celestial object from E. to W. Motion from W. to E. is called direct. The motion of some of the comets is retrograde. The primary planets seem at times to have a retrograde motion, which is because their velocities in their orbits differ from that of the earth. The inferior planets move more rapidly than the earth, and the superior less rapidly. It happens, therefore, that the inferior planets have a motion apparently retrograde near the times of their inferior conjunctions. The apparent motion of the superior planets is retrograde for some time before and some time after their oppositions. The mean periods of retrogradation are: for Mercury, 22 days; for Venus, 42; for Mars, 73; for Jupiter, 120; for Saturn, 140; for Uranus, 152; for Neptune, 158½.

Ret'ting. See FLAX.

Retz, Gilles de Laval de, generally called MARSHAL RETZ, 1404–40; French military officer; b. Machecoul, Loire-Inférieure; distinguished himself in the wars of Charles VII; fought at the side of the Maid of Orleans; was made a marshal of France, but retired subsequently from public life to his castle of Retz. During fourteen years he enticed over one hundred children into his castle and sac-

rificed them to his lust and superstition, being a worshiper of Satan and addicted to magic. He was strangled and burned. See BLUEBEARD.

Retz, Jean François Paul de Gondi (Cardinal de), 1614–79; French prelate; b. Montmirail-en-Brie; was forced against his will into the Church; led an irregular life; active in intrigues against Richelieu, after whose death he was appointed coadjutor to his uncle, the Archbishop of Paris. He tried to supplant Mazarin; acquired a cardinal's hat, 1651, by his intrigues; was arrested 1652, and imprisoned. While in prison he became Archbishop of Paris. He escaped, fled to Spain, and remained a fugitive till after Mazarin's death, when (1662) he made his peace with Louis XIV, and exchanged his archbishopric for the abbacy of St. Denis, Paris.

Reuchlin (roich'lĭn) (Hellenized, CAPNIO), **Johann,** 1455–1522; German scholar; b. Pforzheim; at twenty taught at Basel philosophy, Greek, and Latin; studied law in Orleans, and, 1481, was made teacher of jurisprudence and belles-lettres at Tübingen; later made imperial councilor and employed in diplomacy; for eleven years was president of the Suabian confederate tribunal. He was charged with a leaning toward Judaism for causing the Emperor Maximilian to rescind an order against burning all Hebrew books excepting the Bible; and despite his published vindication, his writings were burned by order of a tribunal organized at Mentz by his chief opponent, the Inquisitor Hoogstraaten. By order of Pope Leo X the proceedings against him were suspended, and the contest resulted really in favor of the study of Greek and Hebrew, which from that time became general among the Germans. In 1529 Reuchlin was made professor at Ingolstadt. Being invited to Wittenberg, he recommended in his place his cousin, Philip Melanchthon. Although suspected of inclining toward Protestantism, he never formally left the Roman Catholic Church. His *Breviloquus, sive Dictionarium singulas Voces Latinas breviter explicans,* has been called the first Latin dictionary (1478), and his edition of the seven penitential psalms (1512) is thought to have been the first Hebrew work printed in Germany. The system of Greek pronunciation which he established is known as iotacism or Reuchlinism.

Réunion (rē-ūn'yŭn), called BOURBON prior to 1848, also ILE BONAPARTE, island and French colony in Indian Ocean; belonging to the Mascarene group; about 100 m. SW. of Mauritius; 38 m. long, 28 m. wide; area, 970 sq. m.; capital, St. Denis; chief port, Pointe-de-Galats; is volcanic; traversed by a mountain chain which divides it into two portions, differing in climate and productions. The Piton de la Fournaise, 7,200 ft., is an active volcano. Maize, sugar, coffee, rice, and tobacco are cultivated. Réunion has no good harbors, and the coast is consequently dangerous. This island was discovered, 1545, by the Portuguese, and occupied by the French, 1649. Pop. (1907) 201,000

Reuss (rois), name of two principalities of former Germany belonging to an elder and younger line of the family of Reuss, and consisting of several separate territories between Prussia, Saxony and Bavaria. The dominion of the elder line, Reuss-Greiz, had an area of 122 sq. m.; pop. (1910) 72,769; capital Greiz. That of the younger line, Reuss-Schleiz Gera had an area of 319 sq. m.; pop, (1910) 152,752; capital, Gera. The surface of both principalities is hilly, reaching over 2,000 ft. in the Thüringer Wald.

Reuter (roi'tĕr), **Paul Julius (Baron),** 1821–99; German promoter; b. Cassel; organized the first telegraph news agency in Aix-la-Chapelle, 1849; transferred his office to London, 1851, and enlarged the system until it included all parts of the world. He obtained a concession for the submarine telegraph line between England and Germany, 1865; one from the French Govt. for the construction of a cable between France and the U. S., completed 1869; was granted, 1872, the exclusive privilege of constructing railways, working mines and forests, etc., in Persia; concession annulled 1889, and in lieu of it he received the concession of the Imperial Bank of Persia.

Rev'al, capital of the new republic of ESTHONIA (*q. v.*); on the Gulf of Finland; 200 m. WSW. of Petrograd; upper or old town contains the cathedral, castle, and houses of the German nobility; lower or new town extends outside the walls. Reval is an important port, exporting grain, spirits, flax, etc.; founded by Waldemar II of Denmark, 1219; became a flourishing Hanse town; held by the Livonian knights, 1346–1561; then belonged to Sweden; and was finally annexed to Russia, 1710.

Reveillé (French, rĕ-vāl'yā; English, rĕv-ă-lē'), signal given in garrisons at break of day, by beat of drum or sound of bugle, for the soldiers to rise and the sentinels to forbear challenging until the retreat is sounded in the evening.

Revela'tion, act of God by which He communicates to man the truth concerning Himself and the knowledge resultant on such activity of God. It includes all modes in which God makes Himself known to men; or, passively, all knowledge concerning God however attained, inasmuch as it is conceived that all such knowledge is, in one way or another, wrought by Him. In its narrower sense it is confined to the communication of knowledge in a supernatural as distinguished from a natural mode; or, passively, to the knowledge of God which has been supernaturally made known to men. Most types of modern theology explicitly allow that all knowledge of God rests on revelation; that God can be known only because and so far as He reveals Himself. It is only with reference to the reality of special revelation that debate concerning revelation continues.

The doctrine of revelation, according to Christian thinkers, is that God has never left Himself without a witness. In the act of creation He has impressed Himself on the work

of His hands. In His work of providence He manifests Himself as the righteous ruler of the world. Through this natural revelation men in the normal use of reason rise to a knowledge of God which is trustworthy and valuable, but is insufficient for their necessities as sinners, and by its very insufficiency awakens a longing for a fuller knowledge of God and His purposes. To this purely natural revelation, God has added a revelation of Himself as the God of grace, which constitute as a whole the process of the new creation. The modes of communication may be various—by dreams or visions, in ecstasy or theophany, by inward guidance, or by the simple objective word; but in all cases the object and result are the direct supernatural communication of special knowledge. See BIBLE; INSPIRATION.

Revelation, Book of, or **Apoc'alypse,** the names given to the last book of the New Testament. It is generally believed that it was written by the apostle John in his old age (95–97 A.D.), in the Isle of Patmos, whither he had been banished by the Roman emperor Domitian. Anciently its genuineness was maintained by Justin Martyr, Irenæus, Clement of Alexandria, Tertullian, and many others; while it was doubted by Dionysius of Alexandria, Cyril of Jerusalem, Chrysostom, and, nearer our own times, by Luther and a majority of the eminent German commentators. The Apocalypse has been explained differently by almost every writer who has ventured to interpret it, and has furnished all sorts of sects and fanatics with quotations to support their creeds or pretensions. The modern interpreters may be divided into three schools, namely, the *historical school,* who hold that the prophecy embraces the whole history of the Church and its foes from the time of its writing to the end of the world; the *Præterists,* who hold that the whole or nearly the whole of the prophecy has been already fulfilled, and that it refers chiefly to the triumph of Christianity over Paganism and Judaism; and the *Futurists,* who throw the whole prophecy, except the first three chapters, forward upon a time not yet reached by the Church—a period of no very long duration, which is immediately to precede Christ's second coming.

Rev'enue, (1) income or annual proceeds from land or other property. (2) The income of a state or nation derived from duties, taxes, and other sources for public use. See FREE TRADE; PROTECTION; TAXATION; TARIFF.

Revere (rē-vēr'), **Paul,** 1735–1818; American patriot; b. Boston, Mass.; served in campaign on Lake George, 1756; became a goldsmith and copperplate engraver; member of the "tea party"; at instance of Gen. Warren, secretly left Boston on night of April 18, 1775, and rode through Charleston to Concord to announce the British expedition of the following day, which was resisted at Lexington and Concord. In the same year he engraved the plates and printed the bills of the paper money of Massachusetts; became lieutenant colonel of state artillery and participated in the Penobscot expedition of 1779; after the war established a foundry for casting cannon and church bells, and built extensive copper-rolling mills.

Reviv'al of Learn'ing. See RENAISSANCE.

Revolu'tion, Amer'ican, war by which the English colonies in America secured their independence; also known as the AMERICAN WAR FOR INDEPENDENCE. The causes of the Revolution were as follows: In 1765 the general opposition to Grenville's Stamp Act led to a congress of delegates from nine colonies, which met at New York and formed a union for the purpose of resisting taxation by Parliament. This congress, however, assumed no powers of government; its proceedings were limited to deliberation and remonstrance, and the union expired with the repeal of the obnoxious law in 1766. In 1774, however, the opposition to Charles Townshend's measures for raising a British revenue within the colonies, inflamed by the stirring events at Boston—the "massacre" of 1770 and the "tea party" of 1773—resulted in a congress of the colonies, which met at Philadelphia on September 5th. Twelve colonies were soon represented, Georgia being the exception. This congress was in reality an assemblage of committees. The colonies voted as entire bodies, casting single votes, the question of proportional representation being waived for the sake of harmony. The congress undertook to exercise no coercive powers. Separation from Great Britain was not then determined on, and was not even generally in contemplation.

The important measures of the congress of 1774 were a declaration which based the rights of the colonies on the laws of nature, the principles of the British constitution, and the several charters or compacts between the colonies and the crown, and denied expressly and completely the right of Parliament to tax the colonies, though recognizing the power of commercial regulation; and, second, nonimportation and nonexportation agreements, the article tea being particularly named in the former, while rice, the product of Carolina, was specially excepted from the prohibitions of the latter. The congress adjourned in October, recommending that another congress be held in 1775, should the grievances of the colonies not meanwhile have been redressed. During the winter which followed, rapid progress was made toward revolution in Massachusetts. The governor, on the part of the crown, dissolved the General Assembly, and called new councilors into office by mandamus, under authority of an act of Parliament revoking so much of the charter of the colony as authorized the assembly to elect the council. The governor's councilors were compelled by a show of popular violence to resign, while a new assembly, elected by the people in defiance of an executive proclamation, met at Salem and resolved themselves into a provincial congress, whose recommendations had all the effect of law throughout the colony. On April 19, 1775, occurred the battle of Lexington, an unforeseen collision between the royal troops marching to seize military stores at Concord and the militia and citizens.

The second Continental Congress met at

Philadelphia on May 10th, following. Most of the delegations had been chosen before the battle of Lexington, when armed resistance to the obnoxious acts of Parliament was not in contemplation. "They were," says Mr. Bancroft, "committees from twelve colonies, deputed to consult on measures of conciliation, with no means of resistance to oppression beyond a voluntary agreement for the suspension of importations from Great Britain. They formed no confederacy; they were not an executive government; they were not even a legislative body." Such, indeed, they were in theory; but the course of events threw upon this body of committees the duties of a revolutionary congress. Blood had been shed; the British troops were besieged in Boston by the militia of New England; Congress, by the necessity of the situation, became the organ of the common resistance. A Continental army was raised; a commander in chief, George Washington, of Virginia, was chosen, in whose commission the phrase "United Colonies" was first used; a Continental currency was created; a general treasury and post-office established; while the whole management of Indian affairs was assumed by Congress. Here we see most of the parts of government emerge. What, meanwhile, had become of the governments of the colonies? Much stress has been placed by some writers on the fact that the revolutionary governments of the colonies were generally not organized until after the Continental Congress had assumed powers of legislation, and had recommended the establishment of new governments in the several colonies. But no inference can justly be drawn from this fact adverse to the full political rights of each colony. The priority noted was a priority in time, not in logic. It was due to the urgent military necessity of the situation, and intimated no supremacy on the part of the Continental Congress. It is not conceivable that the latter body should have assumed to disregard the entity of a single colony, even the smallest, or have proceeded to do anything authoritatively in respect to the organization of colonial governments, or to take territory from one colony for the benefit of another. The colonies in no respect owed their existence or their political rights to the Continental Congress, which was their creature, the organ of their voluntary common action.

On June 17th was fought the battle of Bunker Hill, between the garrison of Boston and the besieging provincials. Though this action was not, as now, regarded as a substantial victory for the Americans, it did much to strengthen the purpose of resistance and to quicken the growth of revolutionary ideas. The progress of the popular mind of the colonies toward independence of Great Britain was hastened by the refusal of Parliament to receive the petition of Congress; by the bombardment of the town of Falmouth, now the city of Portland; by acts of Parliament prohibiting trade with the colonies and authorizing the capture of their vessels; and by the active impressment of seamen on the N. American coast. The military operations of the autumn and winter had not been decisive. The expedition of Montgomery and Arnold against Canada had resulted disastrously; on the other hand, Washington had been appointed commander in chief of the Continental forces, and in consequence of the skill of his maneuvers the British garrison had been compelled to evacuate Boston. A British fleet had also been beaten off Charleston in the action at Fort Sullivan.

The War of Independence may be said to have begun on June 7, 1776; a resolution of independence was introduced into the Continental Congress by Richard Henry Lee, of Virginia, and referred to a committee consisting of John Adams, Thomas Jefferson, Benjamin Franklin, Roger Sherman, and Robert R. Livingston. The DECLARATION OF INDEPENDENCE (*q.v.*) was drawn by Jefferson, and on July 4th, after slight modifications, was adopted and promulgated, the delegations being generally instructed to that end by the respective colonies. On the same day on which the committee was appointed to prepare the Declaration, a committee was appointed to prepare Articles of Confederation, it being fully recognized that independence of Great Britain necessitated union among the colonies, now become states. Yet this committee did not report a plan for confederation until November, 1777, nor were the Articles adopted by all the states before March 1, 1781. During the whole of this period the states, united only by their free consent, were carrying on war with Great Britain at a distinct disadvantage by reason of the absence of authoritative government. This long delay in such an exigency affords a measure of the difficulties of union. One obstacle, however, additional to those previously mentioned, requires to be stated. Seven states—Massachusetts, Connecticut, New York, Virginia, S. Carolina, N. Carolina, and Georgia—owned or claimed considerable tracts of land to the W. of their present limits. The six other states objected to signing the Articles until these unoccupied lands, which were to be defended by the arms and resources of the Confederation, should be ceded for the benefit of the Confederation. This objection, however, was maintained with less vigor by some of these states than by others. Before the close of July, 1778, ten states had ratified the Articles. New Jersey acceded November 26, 1778; Delaware, May 5, 1779; Maryland remained out until March 1, 1781. The contention of Maryland was that without such cession the states owning W. lands would pay their war expenses by sales of lands instead of by taxation; and, secondly, that when this W. territory should be settled, the communities there formed would become politically and socially the satellites of the states under whose laws and administration they had grown up. The contest was finally settled by the patriotic action of New York, which authorized (February 19, 1780) its delegates to cede its W. lands. This action was accepted by Maryland as an earnest of what she had claimed, and she joined the Confederation as stated. Sooner or later all the landed states followed the example of New York—Virginia, 1784; Mas-

sachusetts, 1785; Connecticut, 1786; S. Carolina, 1787; N. Carolina, 1790; Georgia, 1802.

Meanwhile the war had been prosecuted without a government having coercive power. The states, when called upon by Congress for contributions of men and money, responded in their own time and way. The British troops under Sir William Howe defeated the American army on Long Island, August 27, 1776, and soon afterwards occupied the city of New York and the country of the lower Hudson. Before the close of the year Washington had been obliged to retire beyond the Delaware River with a small, ill-provided army, but by the brilliant surprises of Trenton and Princeton the British were thrown back and New Jersey was largely recovered. During the summer of 1777 Sir William Howe transferred the greater part of his force by water to the neighborhood of Philadelphia, which city he captured, after defeating the American army on the Brandywine, September 11th. A bold attack by Washington on the British forces at Germantown (October 4th) was repulsed. At the N., however, the cause of independence found this year a better fortune. Gen. Burgoyne, in command of an army composed of British regulars, Hessians, Canadians, and Indians, in July captured Ticonderoga and Whitehall, and began a movement intended to gain possession of the Highlands of the Hudson, and by opening that river from its source to its mouth to isolate New England. The expedition, however, was wholly disastrous. A strong detachment of British was defeated by a militia force under Gen. Stark at Bennington, August 16th, and in September Burgoyne was brought to bay near Saratoga, and after two severe actions (September 19th and October 7th) was compelled to surrender (October 17th) to Gen. Gates. The battle of Saratoga has often with much reason been regarded as the turning-point or decisive battle of the war. If Burgoyne had succeeded, an open line of communication would probably have been established between Canada and New York, and New England would have been cut off from the possibility of giving active support to Washington. The failure of this brilliant project kept the colonies united and greatly embarrassed the British. Nor was this all. The victory at Saratoga gave great reputation abroad to the American arms, and decided the French king to join in treaties of alliance and commerce with the U. S., which were signed in Paris in February, 1778. Meanwhile Washington had been reduced to straits in keeping the field against the British, and his army encountered the greatest hardships during the winter of 1777–78 at Valley Forge, a day's march N. of Philadelphia. The want of an authoritative government was severely felt in the slow and partial responses made by the states to the requisitions of the Congress. In this strait the issue of bills of credit was resorted to. The depreciation was of course rapid. March 1, 1778, $1 in specie exchanged for $1.75 in paper; September 1st, for $4; March 1, 1779, for $10; September 1st, for $18; March 18, 1780, for $40; December 1st, for $100; May 1, 1781, for $200 to $500.

During the operations of 1778 the coöperation of the French fleet under d'Estaing proved delusive, but the conduct of the British armies was ineffective; Sir Henry Clinton, who succeeded Howe, evacuated Philadelphia and retired on New York. During the movement an indecisive action was fought at Monmouth, the army of Washington remaining in possession of the field. The British forces still held Rhode Island, which they had occupied two years before. Toward the close of 1778 Sir Henry Clinton sent a force against the city of Savannah, which fell December 29th. This result turned toward the S. the efforts of both armies.

During the summer of 1779 the British overran the whole of Georgia, but were compelled to abandon Rhode Island in view of an expected expedition of the troops and fleets of France and Spain, the latter country having declared war against England in June. In September the Americans under Lincoln, assisted by the French fleet, made a futile attack on Savannah, being repulsed with heavy loss. In April, 1780, Clinton in person invested Charleston, which was held by Gen. Lincoln. The defense was weak, and the city was surrendered with the garrison in May; S. Carolina was completely overrun, and Cornwallis, who was left in command by Clinton, threatened N. Carolina. In this emergency troops were detached from the N. army under the command of Gen. Gates, who was reënforced by the militia of Virginia and N. Carolina, but was routed with great loss at Camden, while the patriotic corps of Sumter, who since the conquest of S. Carolina had not ceased to harass the British outposts, was destroyed by Tarleton on the banks of the Wateree. The three southernmost states were now held by the British, while to the disaster at the S. was nearly added the capture of the strongholds on the Hudson through the treachery of Benedict Arnold. In October, however, a considerable detachment of the British army was destroyed by militia at King's Mountain, inducing Cornwallis to retire into S. Carolina; and in December Gen. Greene arrived from the N., superseding Gates. The close of the year found Holland also in arms against Great Britain, though not taking part in the military operations in America.

The campaign of 1781 was destined virtually to close the war in favor of the Americans. January 17th the British, under Col. Tarleton, were defeated at Cowpens, S. C., by Gen. Morgan; March 15th a severe action was fought at Guilford Courthouse between Greene and Cornwallis, by which the British, though they held the field, were so far weakened that they were compelled to retire; on September 8th was fought the severe action of Eutaw Springs, in which the Americans had the advantage. The effect of these actions, combined with the activity of the American partisans under Marion, was to compel the abandonment of N. Carolina and nearly all of S. Carolina by the British, who were content to hold a few places by garrisons. Meanwhile Cornwallis, moving into Virginia with a view to forming a junction with Sir Henry Clinton, was hemmed in

at Yorktown by the troops of Washington and Rochambeau, and after a siege of about three weeks was compelled to surrender his whole force, about 8,000 men, October 19th. The surrender of Cornwallis practically ended the war. No operations of importance followed. In July, 1782, the British evacuated Savannah; a preliminary treaty of peace was signed November 30th of that year at Paris; December 14th Charleston was evacuated; the definitive treaty was signed September 3, 1783; New York was evacuated by the close of November; in December Washington resigned his commission as commander in chief.

Revolv'er, magazine small arm resembling a pistol. It has a chamber which carries a number of cartridges, usually five or six, and which revolves, thus bringing the cartridges in succession in front of the barrel. Revolvers were known to have been used in the early part of the seventeenth century. Colt perfected the revolver by causing the cocking of the hammer to revolve the chamber. A later form of revolver is a hammerless self-cocker; by simply pulling the trigger the chamber is revolved and the piece is fired.

Reward', in law, compensation offered indefinitely to anyone for a particular act, such as the restoration of stolen property or the apprehension of a criminal. The offer may be withdrawn, in the manner in which it was made, at any time before acceptance. Acceptance of the offer consists in the performance of the particular act, with knowledge of the offer, although there are decisions to the effect that knowledge of the offer is not essential to acceptance. From considerations of public policy a peace officer cannot claim a reward for services which are a part of his official duties.

Reybaud (rā-bō'), **Marie Roch Louis,** 1799–1879; French author; b. Marseilles; settled in Paris, 1829; wrote for liberal journals; edited "Scientific and Military History of the French Expedition to Egypt"; published, 1836–40, in the *Review of Two Worlds,* his "Studies of the Reformers or Modern Sociologists," which brought him the Montyon prize from the Academy; elected to the Academy, 1850; sat in the legislature, and after the *coup d'état* of 1851 was a member of the consultative commission. His most popular work was the satirical novel, "Jérôme Paturot in Search of a Social Position."

Reykjavik (rīk'yä-vīk), capital of Iceland, on the SW. coast, at the head of Faxafiord; has a college, medical and divinity schools, observatory, museum, important annual fair, and regular communication by steamships with Leith and Copenhagen. It was founded 874, and celebrated its one thousandth anniversary August 7, 1874. Pop. (1901) 6,682.

Rey'nard the Fox, title of an epic that has been popular the world over for ages; most noted of a large series of beast fables; distinguished by its characters being animals; believed to have originated in Flanders, and thence spread to all lands; hence innumerable versions. The story, according to the "Reinaert" of Willem, a Flemish poet, written in the first half of the thirteenth century, is as follows: At the Eastertide court of the Lion, king of animals, all the animals came and paid him homage except Reynard the Fox, whom many of the animals accused of murderous deeds. Reynard was summoned to the court, tried, and condemned to death by the Lion, but when about to be hanged he begged to be allowed to make public confession of his evil deeds. During his confession he told that the Wolf and the Bear had conspired to kill the Lion and make the Bear king in his place; he also hinted that he knew where immense treasure was hidden. The Lion thereupon pardoned him and caused the Bear and the Wolf to be seized. But when asked to tell where the hidden treasure was, Reynard declared that he was under oath to go to Rome on a pilgrimage and must hasten away; and he was allowed to go. After more misdeeds, including the killing of his companions on the journey to Rome, the Lion became convinced of his treachery and decreed him to be an outlaw.

Rey'nolds, or **Rainolds, John,** 1549–1607; English clergyman; b. Pinhoe, Devon; appointed reader of the theological lecture founded by Sir Francis Walsingham, 1586; dean of Lincoln, 1593; refused a bishopric to accept presidency of Corpus Christi College, 1598; distinguished as a Hebraist; regarded as leader of the Puritan party; prominent in the Hampton Court conference of 1603; executed a small portion of King James's version of the Bible and revised much more in a weekly meeting of the translators; works consist chiefly of controversial treatises against the Church of Rome, academical discourse, and some writings on biblical criticism.

Reynolds, John Fulton, 1820–63; U. S. military officer; b. Lancaster, Pa.; graduated at West Point and entered the artillery, 1841; won brevets of captain and major in Mexican War; transferred to the infantry, 1861, as lieutenant colonel; commanded brigade of Pennsylvania Reserve Corps at Mechanicsville, Gaines's Mill, and Glendale, a division at second battle of Bull Run, and, 1862, the Pennsylvania militia for the defense of the state; promoted major general of volunteers, November, 1862; commanded First Corps, Army of Potomac, at Fredericksburg; killed at Gettysburg in first day's fight, while leading left wing of Meade's army.

Reynolds, Sir Joshua, 1723–92; English painter; b. Plympton-Earle, Devon; studied in London under Thomas Hudson, portrait painter; abt. 1743 began to paint portraits professionally; visited the chief art collections of Italy, 1749–52; returned to London much influenced by Titian's work; first president of Royal Academy, 1768–90; delivered annual addresses on art topics, which constitute the "Discourses of Sir Joshua Reynolds"; knighted by George III, and succeeded Ramsay as court painter. Reynolds painted an enormous number of pictures and accumulated a fortune

large for the time. At the Royal Academy, London, are many important works, including portraits of himself, Lord Heathfield, and Admiral Kappel; "The Age of Innocence," "Heads of Angels," and "Robinetta." In the National Portrait Gallery are his "George III," "Sir William Chambers," etc. The S. Kensington Museum, the Soane Museum, the Dulwich Gallery ("Mrs. Siddons as the Tragic Muse"), the Edinburgh National Gallery, the Hermitage, St. Petersburg, and many private galleries in Great Britain, contain examples of his work. The Metropolitan Museum, New York City, has his "Hon. Henry Fane and his Guardians," "Lady Carew," and some others. Many of his paintings have been engraved.

Re'zin, eighth and last of a line of kings of Damascus, beginning with Hadad, contemporary with David; began to reign about 745 B.C. (2 Kings xv); fought against Judah in conjunction with Pekah of Samaria (2 Kings xv, 37; xvi, 5 *seq.*); against them King Ahaz hired Tiglath-pileser, who took Damascus and put Rezin to death (732 B.C.).

Rezonville', Bat'tle of. See GRAVELOTTE, BATTLE OF.

Rhachitis (rā-kī'tĭs). See RICKETS.

Rhadaman'thus, in Greek mythology, son of Zeus by Europa, and brother of Minos, King of Crete. He was driven out of Crete by Minos and fled to Bœotia, where, after the death of Amphitryon, he married Alcmene. As a special favor Zeus translated him to the Elysian Fields, where he became a judge.

Rhæ'tia, ancient province of Roman Empire; bounded N. by Vindelicia, E. by Noricum, S. by Gallia Cisalpina, and W. by Helvetia; corresponded to the modern Tyrol and the Swiss canton of Grisons. The Rhæti, who lived as shepherds, were said by Livy and Pliny to be of Etruscan descent, and were subdued by the Romans 15 B.C.

Rhamadan'. See RAMAZAN.

Rham'nus. See BUCKTHORN.

Rhaph'ides, or **Raphides,** crystals, often needle-shaped, of salts found within certain plant cells. The oxalates, carbonates, and sulphates, and other salts of lime are those most commonly found.

Rhap'sodists, class of wandering minstrels in ancient Greece whose occupation was the recital of the Homeric and other poetry.

Rhat'any, drug; root of the *Krameria triandra* and *K. ixina,* small woody shrubs growing in the Bolivian and Peruvian Cordilleras. Rhatany root is sold in pieces of various sizes, composed of a dark, reddish-brown bark and a central lighter-colored, woody portion. It has no smell, but a bitter, somewhat sweetish, and very astringent taste. The medicinal principle is a form of tannin, called rhatani-tannic acid.

Rhe'a (in Greek mythology). See CYBELE.

Rhea (in ornithology). See RHEIDÆ.

Rhegium (rē'jĭ-ŭm). See REGGIO DI CALABRIA.

Rhe'idæ, family of birds of the order or suborder *Ratitæ,* containing the S. American ostriches, and differing externally from the African ostriches simply by the three-toed feet, the more slender bill, and the want of caudal plumes. The species of this group are confined to S. America, where they inhabit the open plains. Three species are known: (1) The *Rhea americana,* extending from S. Brazil on the N. to the Straits of Magellan on the S.; (2) *R. darwinii,* from the Straits of Magellan to the Rio Negro, or the boundary between Patagonia and Argentina, and (3) *R. macrorhyncha,* whose habitat is uncertain.

Rheims, or **Reims** (French, răṅs), ancient *Durocortorum*; also *Remi*; city of Marne, France; on the Vesle; surrounded with walls and ramparts planted with trees and affording beautiful promenades. The cathedral, built in the first part of the thirteenth century, is one of the finest Gothic edifices of Europe. In this church all but three of the monarchs of France from Philippe Auguste, 1180, to Charles X, 1824, were consecrated. St. Remigius, the apostle of the Franks, is buried in one of the suburbs. Rheims has extensive manufactures of woolen fabrics, and a large trade in champagne wines. Almost as soon as the Germans had gained a foothold on French territory in the World War, this beautiful cathedral city became an object of military wrath and destruction. On the proven false assertion that the cathedral was being used by the French as a range-finding point, this magnificent structure was bombarded by the Germans first in September, 1914, and several later attacks reduced it almost to complete ruin. Pop. (1911) 115,178.

Rhen'ish Confedera'tion, or **Rhein'bund,** confederation under the protectorate of Napoleon, formed August 1, 1806, by sixteen princes of S. and SW. Germany, who on that date threw off their allegiance to the emperor;

Rhet'oric, according to Aristotle, the art of persuasian; according to Whately, the art of conviction; according to Campbell, the art of discourse. Campbell's definition is the most comprehensive, although Aristotle emphasizes the highest end of rhetorical study. There has been question as to the sciences on which rhetoric is founded. Some—notably Whately—have said logic; others—as Blair—would seem to say æsthetics; still others would say ethics. Instead of regarding rhetoric as founded on a single underlying science, it is perhaps preferable to recognize three departments of rhetoric: (1) *Inventive rhetoric,* founded on logic, having to do with the matter of discourse, and helping us to attain to the true; (2) *æsthetic rhetoric,* founded on æsthetics, having to do with the form of discourse, and helping us to attain to the pleasurable; (3) *ethical rhetoric,* founded on ethics, having to do with the purpose of discourse, and helping us to attain to that which we esteem good.

Rhetoric recognizes three forms of discourse:

(1) *Representative discourse,* in which the matter is presented for its own sake, without especial purpose or especial regard to form. Clearness, accuracy, and completeness are the prime essentials of representative discourse. (2) *Poetry,* in which the matter and the purpose are subordinate to the form. The prime essentials to poetry are, first, a poetic thought; second, poetic diction—to characterize either of which would fall under the province of a special discussion. (3) *Oratory,* which proposes an end to be attained, to which the matter and form of discourse are merely ancillary. The ancients recognized three kinds of oratory—demonstrative, judicial, and deliberative. *Inventive rhetoric* has to do with the choice of themes, the accumulation of material, and the disposition of material.

Ethical rhetoric has especially reference to the purpose contemplated in discourse. This purpose may be either *enlightenment, conviction, excitation,* or *persuasion.* Excitation is not regarded as a distinct end of discourse by many rhetoricians, since ordinarily we seek to excite emotion only that through emotion we may influence the will; but the distinct recognition of excitation is essential to a complete analysis of ethical rhetoric. In all discourse—but especially in oratory—some one of the purposes mentioned above dominates. It is the function of rhetoric to show how discourse may, in matter and manner, be made subservient to that purpose. *Æsthetic rhetoric* has reference to style, or the art of expressing clearly, energetically, and elegantly, the products of inventive rhetoric in adaptation to the ends of ethical rhetoric. The great masters of rhetoric among the Greeks were Aristotle and Longinus; the former, indeed, may be regarded as the father of the art. Among the Romans the most eminent names are those of Cicero, Quintilian, and Horace. Of all the ancient rhetoricians, Quintilian is the most useful and Horace the most attractive. Of English authors, mention should be made of Whately (best on conviction and persuasion), Blair (on style), Kames (on figurative language), and Campbell (on the grammatical properties of style). See GRAMMAR; LITERATURE.

Rhett, Robert Barnwell, 1800–76; American politician; b. Beaufort, S. C.; originally named SMITH; became Attorney-general of S. Carolina, 1832; one of the most pronounced advocates of state rights, nullification, and secession; member of Congress, 1837–49; U. S. Senator, 1851–52; leader in state convention which passed an ordinance of secession December 20, 1860; chairman of the committee which reported the constitution of the Confederate states to the Montgomery convention February, 1861; subsequently a member of the Confederate Congress.

Rhe'um, genus of herbs of the buckwheat family, natives of Siberia, the Himalayas, and W. Asia. See ECZEMA.

Rheu'matism, an acute or chronic disease affecting the joints and other structures, and characterized by inflammation and pain; it results from disturbed metabolism—that is, disturbed chemical action in the tissues and the blood. It is suggested that rheumatism is due to the retention in the system of lactic and uric acids.

Acute articular rheumatism generally begins at early adult age, and is apt to recur through life. Exposure is a strong determining cause, and in many cases it is hereditary. After a short period of indefinite disturbance of health the larger joints swell and become red and painful; there are fever and excessive perspiration, especially at night. Rarely, however, does suppuration ensue. Under suitable care and nursing the disease generally subsides in six or eight weeks, but with treatment the duration is shorter. Few diseases, however, are so treacherous and so liable to relapse. Complications of the heart, etc., are numerous. Chronic articular rheumatism is a disease of old age. It may result from repetition of acute attacks or may come on as a chronic disease from the first. The joints are enlarged and frequently deformed and stiffened, and with every change of weather there are symptoms similar to those seen in acute rheumatism. Chronic rheumatic subjects are liable to chronic bronchitis, to throat troubles, such as tonsilitis or pharyngitis, and to eczema and other skin diseases.

Muscular rheumatism is probably an affection of the connective tissues binding the muscles together. It receives various names, according to the location of the disease—*lumbago* when the muscles of the back are affected, *torticollis* or *wryneck* when located in the neck, *pleurodynia* when the intercostal muscles are implicated.

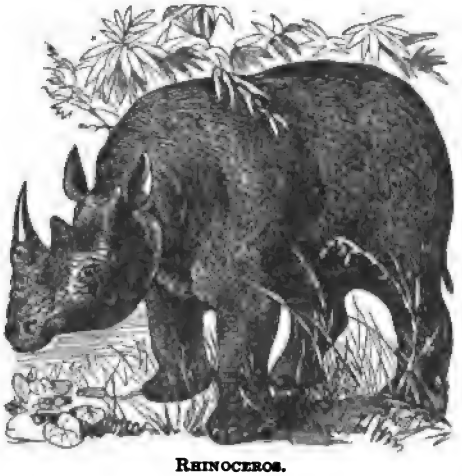
The treatment of rheumatism has undergone many changes. Formerly reliance was placed mainly upon alkalies, which are given to restore the normal alkalinity of the blood and fluids of the body. Salicylic acid and its combinations possess power to control the pain of rheumatism, and possibly they shorten the duration. Rest in bed and warmth are essential. Local treatment of the joints is useful in relieving the distress of the patient. Bland, unirritating diet, especially milk, is required. In chronic rheumatism iodide of potassium, arsenic, and tonics are valuable, but the disease is difficult to cure.

Rhia'nus of Crete, Greek poet; flourished in the latter half of the third century B.C., and composed, among other epic poems, "The Story of Messene," the great source of Pausanias in his fourth book.

Rhine (German, RHEIN; Latin, RHENUS), important river of Europe; formed at Reichenau, canton of Grisons, in the Swiss Alps, at elevation of 1,922 ft., by union of the Vorder and Hinter Rhein, the former of which, rising on the NE. side of the mountain group of St. Gothard, at elevation of 7,600 ft., is generally considered the principal source. Immediately after its formation the Rhine is navigable for rafts and small craft, but during its course from Reichenau to Basel, through Switzerland, the Lake of Constance, and along the frontier

between Switzerland, Bavaria, and Baden, its navigation is difficult, and in many places entirely interrupted by rapids and cataracts. During its course from Basel to Cologne it winds through a broad and fertile valley between the Vosges and the Schwartzwald—the Rheinthal; thence flows, by a narrow gorge, through the plateau of the lower Rhine. In this latter part the Rhine is not only an important route of traffic, but also presents some of the most beautiful scenery in the world. Its course from Cologne to the North Sea leads through low and level ground; it branches off into the Waal, Yssel, Leck, and Vecht, and reaches the ocean as a small stream, almost disappearing among the sandbanks of the shore. The treaty imposed on Germany by the Peace Conference provided that a distance of 50 kilometers from the E. bank of the Rhine should be demilitarized in every respect for all time. This reservation extends from Holland to Switzerland, thus protecting France against another German invasion. The opposite bank was to be evacuated in 19 days.

Rhinocerot'idæ, family of hoofed mammals embracing the various species combined under the popular name rhinoceros; distinguished by their massive form, short neck, long head, the presence in all the living forms of one or two horns on the middle of the nasal region, and the broad clavate feet, each of which has three toes. The family embraces few recent species, which appear to represent only two genera: (1) *Rhinoceros*, including the Asiatic species, which have long upper incisor teeth and a skin corrugated by well-marked folds. To this genus belongs the Indian rhinoceros (*R. unicornis*), the largest of the group, having a single horn; is now restricted to NE. India. The genus also includes the smallest species, the



RHINOCEROS.

Sumatran rhinoceros (*R. sumatrensis*), which has two horns, and ranges from NE. India to the Malay Peninsula, Sumatra, and Borneo. (2) *Rhinaster*, embracing the African species, in which the upper incisor teeth are wanting and the skin is smooth. There are but two species, each having two horns. One of these, *R. simus*, improperly known as the white rhinoceros, is almost extinct, and the other, *R. bicornis*, is rapidly disappearing. While the Indian rhinoceros has often been tamed, the African species is among the most ferocious of animals, being one of the few that attack man without provocation. In geological epochs other forms flourished.

Rhipæ'an Moun'tains, in Grecian mythology, mountains lying in the extreme N. (or W.). Ancient geographers identified them now with the Alps and now with the W. outliers of the Ural Range. See HYPERBOREANS.

Rhizop'oda, class of protozoa characterized by the ability of the individuals to extend temporary protoplasmic processes of the body by means of which locomotion is effected and food obtained (*pseudopodia*). The rhizopods (which live in the ocean, in fresh water, and in moist earth) are usually divided into the *Lobosa*, *Reticularia* (*Foraminifera*), *Heliozoa*, and *Radiolaria*. Here, too, may possibly belong those forms classed sometimes as *Mycetozoa* in the animal kingdom, sometimes as *Myxomycetes* or slime molds in the vegetable kingdom.

RHIZOPODS. Three kinds distinguishable by their cups.

Rhode Is'land, popular name, "LITTLE RHODY"; state flower, violet; state in the N. Atlantic division of the American union; bounded N. and E. by Massachusetts, S. by the Atlantic, W. by Connecticut; extreme length N. to S., 48 m.; extreme width, about 37 m.; area, 1,248 sq. m.; pop. (1910) 542,610; chief towns: Providence (capital), Pawtucket, Woonsocket, Newport, Warwick, Central Falls, Cranston, E. Providence, Lincoln, Cumberland, Westerley, Bristol, Burrillville, Coventry, Johnston. State divided into two unequal parts by Narragansett Bay, which extends inland about 30 m.; surface for the most part hilly, but highest hill (Durfee) only 805 ft.; islands in Narragansett Bay include Aquidneck, or Rhode Island, on which Newport is situated, Prudence, and Canonicut. Block Island is 10 m. from the mainland. Principal rivers, Pawcatuck, forming part of the W. boundary, Pawtuxet, and Pawtucket, the last named the Blackstone above Pawtucket Falls. Climate on the whole variable; coldness in winter much modified by the salt water of Narragansett Bay; climate in the S. part warm and moist, owing to the proximity of the Gulf Stream; rainfall in the E. part about 40 in.; in W., frequently 44 in.

Mineral products include anthracite coal,

graphite, magnetic iron, copper ores, granite, lime, talc; value of products (1910) $800,503. Soil stony, and as a rule unfruitful. Chief agricultural products (1911), corn, 495,000 bu.; oats, 58,000; potatoes, 550,000; hay, 61,000 tons. Farm animals comprised 23,000 milch cows, 11,000 other cattle, 7,000 sheep, 16,000 swine. Chief articles of manufacture, cotton and woolen goods, cotton small wares,

worsted goods, foundry and machine-shop products, jewelry, silverware, rubber and elastic goods, silk; dyeing and finishing of textiles an important industry. Factory-system plants (1909), 1,951; capital employed, $290,901,000; value of products, including custom work and repairing, $280,344,000. Customs districts comprise Bristol and Warren, Newport, and Providence; value of imports for year ending June 30, 1911, $2,785,522; exports (Providence), $14,407. Cod, mackerel, blue fish, and other fisheries of state are of considerable extent. Leading educational institutions, Brown Univ., Rhode Island School of Design, State Normal School, all in Providence; Rhode Island College of Agriculture and Mechanic Arts, Kingston.

Rhode Island, so called from its principal island, the origin of whose name is uncertain, was founded by Roger Williams. The colony originally consisted of Providence (1636), Portsmouth (1638), Newport (1639), and Warwick (1642); towns united 1647 under a parliamentary charter granted 1643; Providence and Newport separated from the confederacy 1651, but were reunited 1654; liberal charter obtained from Charles II, 1663, incorporating the colony of "Rhode Island and Providence Plantations"; Rhode Island opposed, yet suffered severely from King Philip's War; charter suspended, 1686–87, by Sir Edmund Andros. The colony gained great wealth by privateering in the wars waged on the ocean by Great Britain during the Revolutionary War; first British blood shed in consequence of open organized rebellion, June, 1772, when his Majesty's armed schooner *Gaspee* was burned in Narragansett Bay; Newport occupied by British troops, 1776–79; French allies under Rochambeau made it their headquarters, 1780; privateering active and lucrative in War of 1812; defects in the antiquated charter precipitated a crisis, 1841, known as Dorr's Rebellion; present constitution adopted 1843, but present suffrage laws not adopted till 1888. Rhode Island was the last of the thirteen colonies to enter the Union (1790).

Rhodes (rōdz), **Cecil**, 1853–1902; British statesman; b. Bishop Stortford, Hertford, England; went to S. Africa and became interested in the Kimberley mines, amassing a great fortune; in 1890 became prime minister, but resigned January 6, 1895, on account of his supposed connection with Jameson's raid into the Transvaal. To his energy was due the acquisition of mining rights over Mashonaland. As chairman of the British South Africa Company he was prominent in the difficulty with Lobengula. His policy aimed at the removal of race prejudices, and the establishment, under the British flag, of a federal dominion composed of Cape Colony, Natal, the S. African Republic, and other countries of S. Africa. He bequeathed $10,000,000 to found a number of three-year scholarships at Oxford, two to be offered to every state and territory in the U. S., and to every English-speaking colony, and five to students of German descent. See Rhodes Scholarships at Oxford Univ.

Rhodes, largest and most SE. of the Sporade Islands; between the Grecian archipelago and Mediterranean; 9 m. S. of the nearest point in Asia Minor; area, 420 sq. m.; pop. abt. 40,000, mainly Greeks, with a few Jews and Ottomans; climate healthful and delightful; soil fertile, producing figs, oranges, olives, and grapes. Rhodes was during the classic period by turns a great independent maritime power and the ally or victim of the Persians, Lacedæmonians, and Athenians; was famous for its artists, poets, and philosophers, and for its Colossus, one of the Seven Wonders of the world. Overrun by Moaviah, general of Omar, in the seventh century, it subsequently belonged to the Byzantine Empire. In 1309 Foulques de Villaret, grand master of the Knights of St. John of Jerusalem, made it the headquarters of his order. During two hundred and fourteen years it was the bulwark of Christendom against the Mussulmans. The capital, Rhodes, endured a forty-four days' siege by the Egyptians, 1444, and repulsed Mohammed II after a siege of three months, 1480. In 1522 the grand master, Villiers de l'Isle-Adam, with 4,500 soldiers and 600 knights, withstood during five months the Ottoman fleet of 300 ships and 100,000 soldiers commanded by Suleiman I himself. When unable to hold out longer the knights were granted an honorable capitulation, and, 1523, abandoned the island, which since has belonged to the Ottomans. The capital, of same name, on a splendid harbor at the N. extremity of the island, presents an imposing appearance with its lines of maritime fortification.

Rhodes Schol'arships at Ox'ford Univer'sity, scholarships maintained by fund of $10,000,000 left for this purpose by will of Cecil Rhodes. According to his direction, the scholarships

cover a three years' course at Oxford, and are awarded on marks only, three tenths whereof shall be given to a candidate for his literary and scholastic attainments, the remainder for his love of athletics and sports, for strong, manly qualities, such as courage, generosity, etc., high moral character, and especially for ambition to serve and lead in public affairs. He directed that the selection of recipients of this gift should be made two from each state and territory of the U. S., fifteen from Germany, and from one to nine from each of the British colonies. In October, 1904, at the beginning of the Michaelmas term, 72 Rhodes scholars entered Oxford; 43 were Americans, 24 colonials, and 5 Germans. In 1906 the full number, 190, were in residence. The last examination in the U. S. took place in January, 1908. There will be examinations in 1910, 1911, 1913, 1914, and so on, omitting every third year.

Rhode'sia, region in S. Africa administered by the British South African Company; bounded N. by the Kongo Free State and German E. Africa, E. by the Central African Protectorate and Portuguese E. Africa, S. by the Transvaal and Bechuanaland, W. by German and Portuguese W. Africa; divided by the Zambesi River into N. and S. Rhodesia. N. Rhodesia, with area of 291,000 sq. m., pop. about 496,000 (all but 800 natives), comprises Barotseland, or NW. Rhodesia, administrative headquarters Kalomo, and NE. Rhodesia, administrative headquarters Fort Jameson; most important centers, Fife and Abercorn. Surface of N. Rhodesia broken by mountains and plateaus and watered by the tributaries of the Zambesi; mineral products include gold and coal; agricultural products, wheat, oats, rice, coffee, cotton, rubber. S. Rhodesia is divided into the provinces of Matabeleland and Mashonaland; area about 144,000 sq. m.; pop. 633,600, of whom 14,600 are of European and Asiatic birth; chief towns include Salisbury (capital), Bulawayo, Victoria, Umtali, Tuli, Gwelo; surface mountainous in part, with plateaus adapted for agriculture and well watered; mineral products, gold, silver, copper, zinc, coal, chrome iron, lead, and diamonds; agricultural products mainly those of N. Rhodesia.

Rho'dium, metal found 1804 associated with native platinum; whitish-gray and very hard; highest density when fused, 12.1; atomic weight, about 104; one of the most infusible metals, but may be fused in the oxyhydrogen furnace; when pure is not acted on by the most powerful acids. Fusion with saltpeter oxidizes it easily, and even fusion with sulphate of potash converts it into a soluble double salt. Chlorine combines with it at a red heat, forming a soluble chloride. It forms four oxides.

Rhodium, Oil of, balsamic volatile oil obtained from Canary Island rosewood, the woody root of two convolvulaceous plants, *Rhodoriza scoparia* and *R. florida*; employed as a perfume, and to attract fishes and game to traps of various kinds.

Rhododen'dron, large genus of plants of the heath family (*Ericaceæ*), comprising trees, shrubs, and rootlet-climbing epiphytes, with entire, alternate evergreen, or rarely deciduous leaves, and showy flowers in terminal clusters; these with funnel-form five-lobed corollas and usually ten declining stamens. The greatest number of species occurs in the high mountain regions extending from Java and Borneo on

RHODODENDRON.

the S. to Yun-nan and the Sikkim Himalaya in the N. Several are found in China and Japan, two reach Kamtchatka, and one Alaska. The arctic *Rhododendron lapponicum* of Lapland and Greenland occurs in the alpine region of the White Mountains of New Hampshire. The only two other European species are *R. ferrugineum* and *R. hirsutum*, the *Alpenrosen* of the Swiss Alps. The species peculiar to N. America are, on the Atlantic side, *R. maximum*, which occurs sparingly as far N. as Canada, and abundantly throughout the Alleghany Mountains; *R. catawbiense*, a lower and earlier-flowered species on the higher mountains from Virginia S.; and *R. punctatum*, a less showy species of the middle country of the S. states E. of the mountains. In the higher N. Rocky Mountains is a peculiar deciduous-leaved species, *R. albiflorum*; in Oregon, *R. macrophyllum*; in California, *R. californicum*, nearer *R. catawbiense*, but taller, and with more showy blossoms. The Arctic *R. lapponicum* is but a few inches high, while *R. rollissonii* of Ceylon attains a height of 30 ft., with a stem over a foot in diameter.

To develop its greatest beauty the rhododendron should be planted in well-drained peat or in soil largely composed of decaying leaf mold, and situations should be selected for it somewhat protected from the winter sun, the great-

est enemy, with the summer droughts, to all evergreens in the U. S.

Rhodope (rŏd'ō-pē), lofty mountain range in Thrace, noted in poetry as the scene of the revels of the Bacchantes, or female followers of Dionysus.

Rhone (rōn), ancient *Rhodanus*, river of France; rises in Switzerland, on the W. side of the St. Gothard, flows through the Lake of Geneva, crosses the Jura Mountains, turns at Lyon, where it receives the Saône, to the S., and falls, 644 m. distant, into the Mediterranean, through two branches which form the island of Camargue; everywhere very rapid and difficult of navigation. An extensive system of canals connects the river with the Mediterranean, and with the Seine, Loire, Garonne, and (by the Saône) the Rhine.

Rhubarb (rū'bärb), plant of the genus *Rheum*, or its root employed in pharmacy. Rhubarb has been known as a drug from a remote period. It was first brought to Europe

Medicinal Rhubarb.

by land from China to the Levant ports, whence the name Turkey rhubarb, or was shipped directly from China or by way of India, whence the variety called China, Canton, or E. India rhubarb. Rhubarb has a peculiar smell, a disagreeable, bitter, and astringent taste, and a complex composition. A bit of the root if chewed feels gritty, from the presence of crystals of calcium oxalate. In small dose rhubarb behaves as a stomachic bitter, but in larger quantities is an active purge. By reason of the tannin it contains it is also secondarily astringent. It is used in medicine as a stomachic and a laxative or purge, and is especially useful in summer diarrheas from relaxation of the bowels or improper diet.

The leaf stalks of *R. rhaponticum*, also called *pie plant*, are large and fleshy. They have an agreeable acid taste, and are much used for making pies and sauce.

Rhumb, in navigation, the track of a ship sailing on a certain course. A rhumb line cuts all the meridians at the same angle, and when this angle is acute the rhumb is a species of spherical spiral, continually approaching the pole, but reaching it only after an infinite number of turns. The angle under which a rhumb line cuts any meridian is called the angle of the rhumb, and the angle that it makes with the prime vertical at any point is called the complement of the rhumb. The projection of a rhumb on the plane of the equator is a logarithmic spiral.

Rhus (rŭs), genus of shrubs or trees of the *Anacardiaceæ* or cashew family, including about 120 species, mostly natives of warm or hot climates. The flowers have from four to ten stamens and from four to six imbricated petals, and are small, in axillary or terminal panicles; the leaves are usually primate, with from three to five leaflets, though sometimes simple, as in the smoke tree (*Rhus cotinus*); the fruit is a compressed drupe. The poison oak or ivy (*R. toxicodendron*), found from Canada to Georgia, mostly creeping or climbing along rocks, fences, etc., has alternate leaves with three leaflets, flowers in loose slender panicles, and a smooth, pale-brown fruit. The whole plant contains a poisonous caustic milky juice which on contact with the human skin in most cases produces redness, itching, swelling, and blisters. The poison sumac or poisonous dogwood (*R. venenata*) of swamps, with from seven to thirteen leaflets, is even more poisonous.

Poison Ivy.

Rhyme (less commonly Rime), formerly the systematic alliteration of Anglo-Saxon poetry; now usually the similarity between the endings of verses. Strict rhyme requires that the last stress vowel and what follows it should be exactly alike in the rhyming lines, while what precedes the vowel must be in some respect different. Hence "rain" and "reign" do not rhyme, but "rain," "train," and "strain" rhyme with one another. Sometimes, however, words identical in sound but different in sense, such as "rain" and "reign," are allowed to rhyme. Mere spelling has nothing to do with rhyme. Thus "again" rhymes with "men," but not with "complain." Rhyme is chiefly at the ends of lines, sometimes at the ends of cola or sections of a rhythmical period (Leonine rhyme), rarely between almost consecutive

words. This last is rather jingle than rhyme, as in Southey's "Cataract of Lodore." Comic or humorous poetry allows many liberties, and even oddities, in both the distribution and the character of rhymes. Rhyme is not at all indispensable to English poetry, the greatest works of our age and perhaps of all ages being composed in blank or rhymeless verse. See POETRY; PROSODY.

Rhy'mer, or Rymour, Thomas The, name by which an early poet of Scotland is usually mentioned. There is reason to believe that his real name was Thomas Learmount, of Ercildoune (modern Earlston), Berwickshire, who flourished under the reign of Alexander III (*circa* 1283). He was popularly believed to be possessed of prophetic powers derived from the queen of the fairies, who had carried him away and kept him in fairyland three years. The prophecies of Thomas the Rhymer were long preserved by memory, the earliest edition bearing date 1603. The ballad relating his adventures and prophecies is found in MSS. of about the year 1400.

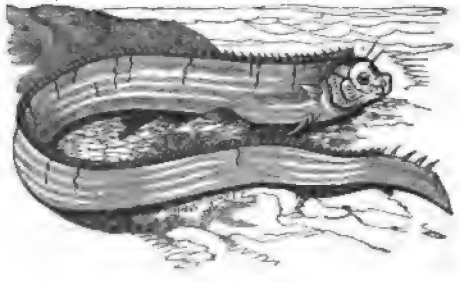
Rhythm (rĭth'm), division of time into small approximately equal units by corresponding units of sound, or less sensibly by muscular movement or visible motion. Rhythm may be felt in movements of the body, as in marching or dancing, for even the deaf enjoy the dance. Rhythm bears the same relation to time that symmetry bears to space. The arts of space and rest, or completion—statuary, architecture, and painting—are based on symmetry, while the arts of time and motion, or execution—dance, music, and poetry—are based on rhythm. Each unit of rhythm contains a loud or strong part and a weak part. In beating time the hand, or baton, descends and remains down during the strong part, then rises and remains up during the weak part. In English the accent in verse, which is chiefly stress, marks the rhythmical unit, while in Latin and Greek, where the accent was chiefly pitch, the unit was marked, not by the accent, but by stress, usually that of long syllables as compared with short; but in both kinds of verse, if there is rhythm, the units, whether marked by accent or by stress, must be virtually equal.

RHYTHM, in music, such an arrangement or grouping of notes and measures as gives to the ear a sense of relative proportion and conduces to the development of sentiment and beauty. Musical notes when thus grouped into form and measure may possess meaning and connection; but neither melody nor harmony can give adequate expression to musical sentiment and feeling without a further grouping into portions equal to each other and marked by accent. This constitutes a higher kind of rhythm, to which the name of compound rhythm is sometimes given. In all regular compositions there is an orderly succession of periods, formed of groups of two, four, eight, or more measures, as the case may be, with subdivisions into phrases, strains, or clauses. Of these periods, those consisting of four or eight bars are the most simple and natural to the ear. Periods of three, six, or nine bars are also in use, but those consisting of five or seven are irregular and less satisfactory, unless it may happen that the composer's purpose is to create a disturbing effect for dramatic or emotional reasons whereby the exception may be justified. The study of rhythm is of essential importance as the foundation of all regularity and excellence in musical composition.

Ribault (rē-bō'), **Jean,** abt. 1520–65; French soldier and colonist; b. Dieppe; employed by Coligny to establish a French Protestant colony in N. America; leaving Dieppe, February 18, 1562, explored the St. John's River, Florida; thence sailed N., established twenty-six colonists in a blockhouse called Fort Charles, on Port Royal harbor; then returned to France. No aid was sent to the colonists, and after enduring great sufferings they abandoned the fort. In 1564 Ribault was commissioned governor of a contemplated colony in Florida. He sent René de Laudonnière, who built Fort Caroline on the St. John's River. In May, 1565, Ribault sailed for this colony with seven vessels and 300 men. In September the French were attacked by Spaniards under Menendez de Avilés; the fort was taken and its garrison massacred; Ribault's ships were wrecked in a hurricane, and he and his companions after wandering for some time on the coast capitulated to Menendez, and were butchered.

Rib'bon, narrow band of woven silk, used chiefly as an ornament of female attire. Though used in many nations from remote antiquity, the manufacture of ribbons as an article of commerce dates only from the seventeenth century, and has flourished chiefly in France, the cities of Tours, Lyons, and Avignon being largely engaged therein. The chief seats of ribbon manufacture are St. Étienne, France; Basel, Switzerland; Crefeld, in Rhenish Prussia, and Coventry, in England.

Ribbon Fish, various fishes, chiefly belonging to the family *Trachypteridæ*, so called on account of their much compressed, elongated, and bandlike bodies.

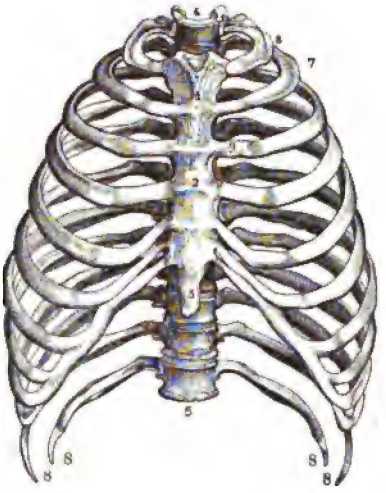


RIBBON FISH.

Ribot (rē-bō'), **Augustin Théodule,** 1823–91; French genre and portrait painter; b. Breteuil, Eure; medals, Salons, 1864 and 1865; third-class medal, Paris Exposition, 1878; Legion of Honor, 1878; "St. Sebastian," "Christ and the Doctors," and "The Good Samaritan," are in the Luxembourg Gallery, Paris.

Ribs, the curved bones which form the lateral framework of the chest. They serve as points of attachment for the muscles, which

perform the respiratory motions, and by their resistance and elasticity protect the lungs, heart, and great vessels from violence and injury. The ribs, in man, are usually twenty-four in number, twelve on each side, but may be one or two more or less in exceptional cases. They are articulated to the spine behind, but in front only the upper seven are connected



Ribs. 1, 2, 3, sternum; 4, circumference of upper portion of thorax; 5, circumference of base of thorax; 6, first rib; 7, second rib; 8, last two, or floating ribs; 9, costal cartilages.

with the breast bone by cartilage. Of the remaining five, three connect with the cartilage of the seventh, while the lower two are unattached and termed free or floating ribs. The ribs are elastic, and being articulated in front and behind move freely upward and outward in inspiration, and reversely downward and inward in expiration. The chief injuries to the ribs are separation from their attachments to the spine or sternum, and fracture. The fractured rib is detected by local crackling of the fragments in respiratory movement, and by the severe local stitch or pain it gives the patient.

Ricardo (rĭ-kär'dō), **David**, 1772–1823; English political economist of Jewish parentage; b. London; after acquiring a fortune as a stock broker, London, studied mathematics, chemistry, and mineralogy; was one of the promoters of the London Geological Society; elected to Parliament, 1819; chief publication, "On the Principles of Political Economy and Taxation." Ricardo stands next to Adam Smith in the British free-trade school of political economists, and his writings have exerted a powerful influence on subsequent students of the science.

Riccio (rēt'chō), **David.** See Rizzio.

Rice, James, 1844–82; English novelist; b. Northampton; called to the bar, 1871; edited *Once a Week*, 1868–72; for eight years was London correspondent of the Toronto *Globe*; was joint author with Walter Besant of many novels.

Rice, the *Oryza sativa*, cereal of the grass family; characterized by a one-flowered spikelet with small glumes, less than one fourth the length of the palets, which completely envelop the grain when mature; six stamens; stigmas with branching hairs; oblong, free, smooth grain; flowers in a somewhat erect panicle, which droops as the grain matures; it is an annual, 2 to 5 ft. high at maturity.

Rice is indigenous in some parts of India, and has been cultivated from the earliest times; was introduced into China abt. 2822 B.C.; cultivated in the Euphrates valley at least four hundred years before Christ. At what period it was introduced into the U. S. is not well settled, but one account states that it was grown in Virginia by Sir William Berkley as early as 1647. It is extensively cultivated in India, Siam, China, Japan, and portions of S.

Rice Bearded and Beardless Varieties. Separate spikelet enlarged.

Africa, in which countries it constitutes the principal article of food for their dense population. In many of the marshy districts of those countries it is almost the only object of agricultural labor.

In Oriental countries, where rice is the most important cereal, the several processes of cultivation and harvesting are still carried on in a primitive way. In Japan the average product per acre is 40 bu. on marsh land and 30 bu. on high land. Four or five acres of marsh land, costing $200 per acre with an annual government tax of $6, form quite a respectable holding for a farmer in Japan. The wages of an able-bodied farm hand are about $35 to $50 a year; women can be hired for much less.

In the U. S. the Carolina methods of rice culture have mainly prevailed. Alluvial lands are selected along the rivers, above salt water, and low enough to be subject to overflow by the tide. The fields, from four to twenty acres in size, are ditched, so as to be easily drained, and protected by a strong levee next the river; they are usually intersected by small parallel drains, about 200 ft. apart. Late in the fall or early in the winter the fields are plowed and flooded with water, admitted through the

levee so as to prevent the growth of grass, and to loosen and fertilize the soil. In the latter part of February the water is drawn off, and in a few weeks the land becomes dry enough for cultivation, when the clods are pulverized by a harrow and the soil brought into the requisite tilth. When ready for planting, in April or the fore part of May, trenches are made with a hoe, or a small cultivator, 12 to 15 in. apart and 3 or 4 in. deep, at right angles with the drains. The seed is sown at the rate of 2 to 3 bu. per acre, and covered lightly with soil, which should be done in one day; then sufficient water is let in to saturate the soil thoroughly, and this condition of perfect saturation is continued for four or six days, till the grain begins to sprout. Water is again applied when the sprout is 2 or 3 in. above the ground. This second water is removed after about six days, and the earth is stirred with the hoe once or twice, till the plant is about six weeks old, when the field is again irrigated for two weeks. If the field is free from water weeds the water may remain on permanently; if not, it should be drawn off, and as soon as the soil is dry it should be hoed, then flooded till the grain begins to ripen. When mature the rice is cut with a sickle, bound in small bundles, and shocked in the field like wheat, or upon some dry place. As soon as dry it is put into stacks, about 6 ft. in diameter, till cured, and afterwards transferred to large stacks.

The most favorable conditions for rice growing are much vegetable matter in the soil, and such a depth of water as to irrigate without cooling or heating the roots too much. It requires an atmospheric temperature of from 70° to 80° to ripen the grain properly, and for this reason rice should be grown near large bodies of water.

Rice as it comes from the thresher is known as rough rice, or paddy. For handling and storing it is better to leave it in this condition, as the hull is a great protection to the grain. In a modern rice mill the rice is emptied from a sack into a hopper at the storehouse; passes from the hopper into a large fanning mill or separator, and is freed from all foreign substances; transferred to the mill by a belt conveyor; the hull is removed by passing the grain between heavy millstones (about 5 ft. in diameter) which revolve rapidly, but are not close enough together to break the kernel; goes to the mortar, and is pounded for two hours; by these processes the hull and cuticle are removed and the grain is scoured. The hulls are disposed of as worthless refuse; the cuticle and undercoating scoured off are the rice bran. The rice then passes through an inclined cylindrical wire revolving screen, with the meshes becoming coarser toward the lower end, thus assorting the rice into three or four grades; the finest is the brewers' rice, used for the production of light beer, and usually brings about one half the price of head rice; another is the middling rice, which includes the larger broken rice, and sells for nearly one cent per pound less than head rice; the whole rice or head rice, which passes from the screen into the polisher, where it is brushed and finished. Rice bran and rice polish are excellent food for cattle and hogs, rating higher than wheat bran and wheat middlings. Rice straw is more palatable to animals than oat straw, and preferred as a coarse fodder; it is largely used for wintering stock. It makes an excellent quality of paper.

Rice production in the U. S. attained considerable proportion in the colonial times. In 1707 seventeen ships left S. Carolina with cargoes of rice. In 1730 the product was 21,153,054 lb.; in 1755 it reached 50,747,090 lb.; and in 1770, 75,264,500 lb. This was raised with slave labor, and mostly exported to Europe and the W. Indies. For the next seventy years there was practically no increase, but in 1899 it had increased to 136,990,720 lb.; in 1910 to 24,510,000 bu., valued at $16,624,000, a record crop.

Rice'bird. See BOBOLINK; JAVA SPARROW.

Rice, In'dian, Wa'ter Rice, or Water Oats, annual aquatic grass (*Zizania aquatica*) belonging to the true rice tribe, though of inferior value, from 5 to 10 ft. high, which abounds in marshy regions of the U. S., especially in Minnesota. Its grain was formerly much used by the Dakota and Chippewa Indians, and forms an important portion of the food of the game birds of the NW. Its stem is employed as a paper stock.

Rich, Edmund, Saint (French, SAINT EDME), abt. 1190–1242; Archbishop of Canterbury; b. Abingdon; taught philosophy at Oxford, 1219–26; consecrated Archbishop of Canterbury, 1234, and enforced discipline amid general opposition. In consequence of a disagreement with Henry III and the pope about appointments, he retired to the Cistercian abbey of Pontigny in France abt. 1239; canonized by Innocent IV, 1246. He wrote a volume of "Constitutions" in thirty-six canons, "Speculum Ecclesiæ," and left MS. treatises, now in the Bodleian Library.

Rich'ard, name of three kings of England, who follow: RICHARD I (surnamed CŒUR DE LION—"the lion-hearted"), 1157–99; second King of England of the line of Plantagenet; b. Oxford; third son of Henry II and Eleanor of Aquitaine; joined his mother and his two brothers in rebellion against his father, 1173; reconciled to him, September, 1174; became involved in wars with his brothers, but was reconciled, 1184; made war on the Count of Toulouse; aided his father against Philip Augustus, and later, in alliance with Philip Augustus, waged successful war on his father. Succeeding to the throne, July, 1189, he set out on the third crusade, July, 1190, with the King of France. On his way he captured Messina and conquered Cyprus. Arriving before Acre, June 8th, he took part in the capture of the city, but soon quarreled with the French king, who returned to France. Richard advanced toward Jerusalem; defeated the Saracens at Arsuf in September; took and fortified Jaffa; took Askalon, January, 1192; set out twice for Jerusalem, but was called back each time by hostilities, but, being obliged by the state of affairs in England to return, made a truce with Sultan Saladin. On his way home he was shipwrecked at head of the Adriatic; endeavored

to make his way by land through Austria; seized and imprisoned by Leopold, Duke of Austria, with whom he had quarreled; handed over to the Emperor of Germany, by whom he was detained more than a year; liberated on pledge of a heavy ransom in February, 1194; found his brother John assuming the functions of king, but soon forgave him; engaged in a war with Philip Augustus of France, whom he defeated and forced to sign a disadvantageous truce, and renewed the war three years later with a similar result, but was mortally wounded March 26th by an arrow from the castle of Chalus-Chabrol, which he was besieging; succeeded by his brother John. **Richard II**, 1366–1400; King of England; b. Bordeaux, France; son of Edward the Black Prince and Joanna of Kent; succeeded to the throne on the death of his grandfather, Edward III, June 21, 1377; was controlled by his uncle, John of Gaunt, Duke of Lancaster; maintained a feeble warfare with France; encountered a vigorous opposition from Parliament and from the common people in the imposition and collection of a poll tax, which gave rise to the insurrection of Wat Tyler, June, 1381; married Anne of Bohemia, daughter of Emperor Charles IV, January, 1382; invaded Scotland with slight result beyond the burning of Edinburgh, August, 1385; attempted to emancipate himself from the council of regency, which was reorganized under the Duke of Gloucester, November, 1386, but without success; assumed the government, May, 1389. For the next few years he ruled constitutionally, but, 1397, calling a new parliament, he took vengeance on Gloucester and his adherents. Quarreling with his cousin, Henry of Bolingbroke, Duke of Hereford, Richard banished him for ten years, 1398, and in the following year seized the Lancaster estates, John of Gaunt having died. Bolingbroke prepared to recover his estates, and when Richard returned from a short visit to Ireland he found his rival already in possession of the kingdom. Richard was taken prisoner and deposed by Parliament in favor of Bolingbroke, who ascended the throne under the title of Henry IV, to the exclusion of the legitimate heir, Roger Mortimer, Earl of March. The dethroned king was kept a prisoner at Pontefract Castle, but soon disappeared, having been murdered, as was believed, by his keeper. **Richard III**, 1452–85; last Plantagenet King of England; b. Fotheringay Castle; third son of Richard, Duke of York, and Cicely Neville; on his father's defeat and death, 1460, was sent for safety to Holland, but recalled next year by his brother, Edward IV, who created him Duke of Gloucester and lord high admiral; was faithful to his brother throughout the reign, sharing in his flight, 1470, and commanding the van of the Yorkist army at the battles of Barnet and Tewksbury, 1471. He was made lieutenant general of the kingdom on the breaking out of war with Scotland, 1480; took possession of Berwick; penetrated to Edinburgh, and dictated terms of peace, 1482. Hearing of the death of Edward IV while still in Scotland, 1483, he took the oath of allegiance to his nephew, Edward V, and required his generals to do the same; but soon afterwards forcibly assumed the guardianship of the young king, imprisoning leading nobles of the queen's party. Appointed protector and defender of the realm early in May, he ordered the seizure and instant execution of Lord Chamberlain Hastings on a charge of conspiracy, June 13th; asserted his own title to the throne on the ground of illegitimacy of his nephews, June 22d–24th; obtained from Parliament a favorable decision, and was crowned king, July 6th. He was soon suspected of having caused the princes to be murdered in the Tower. Having repressed a conspiracy in behalf of the Earl of Richmond as head of the Lancastrian party, and put to death the Duke of Buckingham (his own former partisan) he convoked a parliament which declared him lawful king, January, 1484. Richard sought to strengthen his throne by treaties with Scotland and Brittany, but was unable to prevent the invasion of the Earl of Richmond, who landed at Milford Haven, August 7, 1485, and was defeated and killed at Bosworth, August 22, 1485, the victor becoming king under the title of Henry VII.

Richard Plantag'enet, 1209–72; Earl of Cornwall and titular Emperor of Germany; b. Winchester, England; younger son of King John; commanded an expedition to Guienne, 1225; went on a crusade, 1240; returned to England, January, 1242; accompanied his brother, Henry III, in his French campaign of that year, but soon lost the province of Guienne and escaped to England; married a princess of Provence, 1243; was chosen Emperor of Germany by a faction, 1256, and crowned King of the Romans at Aix-la-Chapelle, May 17, 1257; was unable to obtain general recognition; took refuge in England; made prisoner by Simon de Montfort at battle of Lewes, 1264; held a diet at Worms, 1269; returned to England, 1269.

Rich'ardson, Sir Benjamin Ward, 1828–96; English hygienist; b. Somerby, Leicester; settled in London, 1849; physician to Royal Hospital for Diseases of the Chest, 1854–67; Royal Literary Fund, 1871, and Newspaper Press Fund, 1874; member Royal College of Physicians and Surgeons, 1856; fellow, 1861; founded and edited *The Journal of Health and Sanitary Review*; gained the Astley Cooper prize of £300 by treatise "On the Cause of the Coagulation of the Blood," and the Fothergillian gold medal by disquisition "On the Diseases of the Fœtus"; originated the use of ether spray for the local relief of pain in surgical operations (1866); introduced methylene bichloride as a general anæsthetic (1867); president Medical Society of London; gained a high position by original experiment; knighted, 1893.

Richardson, Charles, 1775–1865; English philologist; studied but never practiced law; devoted himself to literature in London; published "Illustrations of English Philology"; undertook the lexicographical articles in "The Encyclopædia Metropolitana," for which he also prepared his great work, a "New Dictionary of the English Language," which (the first part appearing 1818) was suspended soon after-

wards by the failure of the proprietors, and completed as a separate work, 1837; also published a "Supplement" to his dictionary, a work "On the Study of Language," and an "Historical Essay on English Grammar and English Grammarians."

Richardson, Samuel, abt. 1689–1761; English novelist; b. Derbyshire; learned the printing trade; became a publisher in London, printer of the journals of the House of Commons, master of the Stationer's Company, and purchased, 1760, a half interest in the office of king's printer. His novels, "Pamela" (1740, with a continuation, 1741), "Clarissa Harlowe" (1748), and "Sir Charles Grandison" (1754), enjoyed an unbounded success, and had numerous imitators not only in England, but in Germany and France, where they profoundly influenced the whole development of prose fiction. Richardson is the first English novelist. His novels are all in the form of letters, show little acquaintance with men on the part of their author, and had their strongest popularity among women.

Richelieu (rēsh-lē-uh'), **Armand Jean Duplessis de** (Duke and Cardinal), 1585–1642; French statesman; b. Paris; prepared for the army, but turned to the Church; consecrated bishop, 1607. Elected to the States-General, 1614, he allied himself with the queen mother and regent, Marie de Médicis; was appointed her almoner, and became a member of the Council of State. When, shortly after, dissensions broke out between the king (Louis XIII) and his mother, Richelieu accompanied the latter to Blois, and later brought about a reconciliation between them; was rewarded with the cardinal's hat, 1622; reëntered the Council of State, and was soon after made Prime Minister, which office he filled to his death. His designs for the consolidation of the monarchy and the greatness of France comprised the extinction of the last remains of feudalism, the full subjection of the high nobility to the crown, the suppression of Protestantism, and the abasement of the house of Austria. He encouraged the rising of the Protestant princes in Germany, the revolution of the provinces in the Netherlands, and the revolt in Catalonia. He subsidized Gustavus Adolphus, and, after the death of the latter, took the Duke of Saxe-Weimar and his army into the French service, and carried on the war against the emperor with great vigor. He also declared war against Spain, and succeeded in separating Portugal from Spain, 1640. The results of these wars he did not live to see, but by the Peace of Westphalia (1648) the progress of the house of Austria was effectually checked. By his internal policy he finished what Louis XI had begun—the overthrow of the feudal power of the nobility. His government was marked by an almost uninterrupted series of conspiracies among the feudal nobility of the realm, headed by the queen mother (whose favor had turned into a deadly hatred), by the queen herself, Anne of Austria, by Gaston of Orleans, the brother of the king, and by the royal princes.

The king felt a deep antipathy against him, and on this circumstance the first conspirators based their hope of overthrowing him; but on November 11, 1630, when the king had consented to his dismissal and the whole court exulted, Richelieu forced himself into the presence of Louis, turned him around in a moment, and reappeared with great dramatic effect among his enemies, stronger than ever. Marie de Médicis fled from place to place in foreign countries; Gaston of Orleans was made utterly contemptible by his cowardly submission; Montmorency, Marillac, Cinq-Mars, and many others were beheaded. Besides the feudal nobility, there was another political power in France at the time when Richelieu took the reins—namely, the Huguenots—and to crush this steadily increasing influence was one of the great objects of his policy. He laid siege to their principal stronghold, La Rochelle, and this siege is one of the most memorable events in the history of France. On October 28, 1628, the city surrendered, four fifths of its inhabitants having perished by the sword and by famine. By the fall of La Rochelle the political power of the Huguenots was wholly broken, but Richelieu's further measures concerning them were moderate and even magnanimous. The cardinal founded the Jardin des Plantes, enlarged the Sorbonne and the royal library, and gave substantial encouragement to many scholars, poets, and artists. He wrote "Mirame" and "La Grande Pastorale." His "Lettres, Instructions Diplomatiques," etc., were edited by Avenel (six volumes, Paris, 1853–68). Of the "Mémoires du Cardinal de Richelieu," "Testament Politique du Cardinal de Richelieu," and "Journal du Cardinal de Richelieu," the last is spurious, and the first two of doubtful authenticity.

Richelieu (rē-shē-lō'), also called SOREL, or CHAMBLY, historic and beautiful river of Quebec, Canada; affluent of the St. Lawrence, discharging Lake Champlain; length, 80 m. It is navigable, except for rapids between St. John and Chambly, and this gap is supplied by a canal. The valley is fertile and attractive, and in it were made some of the earliest settlements in the province. It also served as a battle ground for over two centuries, beginning with Champlain's Iroquois campaign, 1609.

Rich'mond, Legh, 1772–1827; English religious writer; b. Liverpool; became curate of Brading and Yaverland, Isle of Wight, 1798; chaplain to the Lock Hospital, London, 1805, and was rector of Turvey, Bedfordshire, from 1805 till death; author of several popular tracts, circulated by millions in many languages, especially "The Dairyman's Daughter," "The Negro Servant," and "The Young Cottager"; also edited "The Fathers of the English Church, or a Selection from the Writings of the Reformers and Early Protestant Divines of the Church of England" (eight volumes).

Richmond, Margaret Beaufort (Countess of), 1441–1509; b. Bletsoe, Bedford, England; daughter of the Duke of Somerset, great-grandson of Edward III, and wife of the Earl of Richmond, half brother to Henry VI, by whom at age of eighteen she had one son, afterwards Henry VII. After the death of the

earl she married again twice. She endowed Christ's and St. John's colleges, Cambridge, and a professorship of divinity in each, and translated devotional works into English. The principal title of the Tudor, Stuart, and Brunswick dynasties to the English throne was derived through her descent from Edward III through John of Gaunt.

Richmond (ancient, *Syenes* and *Sheen*), town of Surrey, England; on the Thames, 10 m. SW. of St. Paul's, London. Only a gateway remains of the royal palace of Sheen, rebuilt by Edward III, who died there. In 1499 the palace was burned down, but was rebuilt by Henry VII, who changed the name to Richmond. Elizabeth was imprisoned here for a short time by Mary; she afterwards often resided here, and died here. Under the Commonwealth the palace was partially destroyed, and in the eighteenth century was pulled down. In the neighborhood is Richmond Park, formed by Charles I, 1634; covers 2,253 acres, and is surrounded by a brick wall nearly 8 m. in length. From Richmond Hill and Richmond bridge (1774–77) striking views of the surrounding beautiful scenery can be obtained. Pop. (1901) 31,677.

Richmond, capital of Wayne Co., Ind.; on Whitewater River; 68 m. E. of Indianapolis; in an agricultural region 700 ft. above tide water; engaged in manufacturing and general trade; has natural gas; seat of Earlham College (Orthodox Friends), Morrison Public and County Law libraries; public buildings include county courthouse, State Asylum for the Insane, two orphans' homes, a home for friendless women, and city hospital. Pop. (1910) 22,324.

Richmond, capital of Virginia and of Henrico Co.; on the James River; 127 m. NW. of the Atlantic; area, 5½ sq. m.; with suburbs, about 16 sq. m.; built on series of hills, 172 to 249 ft. high; river here crossed by several bridges connecting city with Manchester, Spring Hill, and other suburbs. The city has an admirable system of parks and squares, the most noted being Capitol Square, twelve acres, on Shockol Hill, containing the Greco-composite state capitol (1796), in which are Houdon's marble statue of Washington, many portraits of governors, military officers, and other distinguished Virginians; and the two legislative halls. The State Library building, in which are preserved the parole signed by Lord Cornwallis at Yorktown, the original Virginia bill of rights, and the Virginia ordinance of secession, is located in the same square. The park surrounding the capitol has three fountains; Crawford's equestrian statue of Washington surrounded by bronze statues of Patrick Henry, John Marshall, Andrew Lewis, George Mason, Thomas Jefferson, and Thomas Nelson, by Crawford and Rogers; Foley's bronze statue of "Stonewall" Jackson; and Hart's marble statue of Henry Clay. In Hollywood Cemetery, where 12,000 Confederate soldiers lie, is a memorial of rough blocks of granite, forming a pyramid 90 ft. high, erected by the women of Richmond. Educational institutions are many and important. According to U. S. census, 1909, there were 380 "factory-system" manufacturing plants, employing 14,489 hands, yielding annual products valued at $47,358,000, chiefly tobacco in various forms, foundry and machine-shop products, railway cars, carriages and wagons, and lumber. As a port of entry Richmond had imports of merchandise in fiscal year, 1910–1, $998,929; exports, $26,072.

As early as 1609 a settlement was made by the English on what is now the lower portion of the city. Col. William Byrd built a mill near the falls, 1679; the place was known as Byrd's Warehouse till May, 1742, when it was incorporated as a town; 1779, the seat of government of the commonwealth was removed from Williamsburg to Richmond; 1781, the city was taken and burned by Arnold. In June, 1861, it was made the capital of the Confederate States, and there the Confederate Congress met on July 20th following. During the Civil War the city was the objective point of the principal operations of the Union army in Virginia, and it was evacuated, April, 1865. Pop. (1910) 127,628.

Richmond Bor'ough. See NEW YORK (city).

Richmond Campaign', popular name for the operations of the Union army for the capture of the Confederate seat of government in the Civil War. Although geographically near the NE. frontier, the city of Richmond, Va., was practically the military center of the Confederacy. The railroads extending from it to every part of the S. and SW. were well adapted for military purposes, and its defensive position was excellent. On two sides it was covered by the James; on the other sides the Chickahominy and swamps formed a natural defense. McClellan's Peninsular Campaign (1862) threatened but did not reach Richmond. Between 1862 and 1864 several expeditions, mostly of cavalry, were undertaken rather with the design of liberating the Union prisoners and destroying the public works than of permanently holding the city, but with little result. Meantime the defenses of Richmond had been made too strong to be assailed in front, and the operations of Grant, although really directed against that city, took the form of the siege of Petersburg.

On the night of April 2–3, 1865, at the same time with Petersburg, it was abandoned by the Confederates. Ewell, who commanded the rear guard, ordered the bridges to be burned, the ironclads in the river blown up, and everything destroyed which could be of use to the enemy. Fire was set by his orders to four government warehouses in the heart of the city, whence the flames spread rapidly. The Union army entered in the morning. The conflagration could not be suppressed till toward evening. Fully one third of Richmond had been burned, comprising nearly all its business portion.

Richter (rĭch'tẽr), **Gustav Karl Ludwig,** 1823–84; German historical and portrait painter; b. Berlin; studied in Berlin and Paris; professor in Berlin Academy; member of Munich and Vienna academies; medals at the exhibitions in Brussels and Vienna, 1873; Philadelphia, 1876, and Munich, 1883; second-class medals, Paris Salons, 1857 and 1859, and

Paris Exposition, 1855; one of his most celebrated works, "Portrait of Queen Louise," in the Cologne Museum; was the most famous portrait painter in Germany in his time.

Richter, Johann Paul Friedrich (popularly, JEAN PAUL), 1763–1825; German author; b. Wunsiedel, Bavaria; taught in private families for ten years; settled in Bayreuth, 1804; writings abound in a bewildering variety of playful, witty, pathetic, childlike, and sublime thoughts, so incongruously expressed that Reinhold published, 1810, a work to unravel his meaning; best known: "Selections from the Papers of the Devil," "Biographical Recreations under the Cranium of a Giantess," "Marriage, Death, and Wedding of Lawyer Siebenkas," "Wild Oats," "Introduction to Æsthetics," "Titan," "Hesperus," "Dominie Wuz," "Quintus Fixlein," and an unfinished "Autobiography"; was called the author of the lowly born, poverty-stricken, neglected, and despised.

Ric'inus. See CASTOR OIL.

Rick'ets, a disease characterized by deformities of the bones and various visceral disturbances. It occurs as a rule in infants from twelve to eighteen months of age. The predisposing causes are bad hygienic surroundings, and improper food and clothing. It develops almost imperceptibly. The little patient seems to lose spirit, and indigestion sets in, accompanied by swelling of the abdomen and colic. There is early a tendency to sweating about the head and restlessness during sleep. The teeth are very late in making their appearance, and decay rapidly after doing so. As the disease advances the bones grow softer, and become distorted. Various deformities of the head, limbs, chest, and pelvis are brought about. The treatment is fresh air, sunlight, good food, bathing, and cod-liver oil. Rachitic children frequently become unusually strong, though deformed, in adult years. Many, too, are brilliant mentally.

Ricord (rē-kōr'), **Philippe,** 1800–89; French surgeon; b. Baltimore, Md., of French parentage; went to Paris, 1820; practiced in the provinces for two years; returned to Paris, and was attached to the Pitié Hospital as surgeon; became surgeon in chief of the Hôpital du Midi, 1831; acquired wide reputation by his treatment of venèreal diseases; obtained the Monthyon prize, 1842; appointed consulting surgeon to Napoleon III, 1869; received more than 200 decorations from foreign governments throughout the world; president French Academy of Medicine; author of numerous works in his special department.

Rid'derstad, Kärl Fredrik, 1807–86; Swedish novelist; b. Södermannland; member of the Riksdag, where his eloquence and patriotism gained him fame; author of several historical romances from the time of Gustavus, the best of which are "The Halberdier" and "The Prince," and a number of novels of contemporary life in imitation of Eugene Sue.

Rid'dle, Joseph Esmond, abt. 1804–59; English classical scholar; took orders in Church of England, 1832; curate of Harrow; Bampton lecturer, 1852; author of a valuable "Latin-English Dictionary," an "English-Latin Dictionary," a "Manual of Christian Antiquities," "Natural History of Infidelity," etc.

Rideau (rē-dō'), lake, river, and canal of Ontario, Canada; canal connects Ottawa on the Ottawa River with Kingston on the St. Lawrence, passing from Lake Rideau along Rideau River to the N., and through Mud Lake and along the Cataraqui to the S.; length, 126 m.; projected 1812, it formed an important means of internal communication, now rendered relatively unimportant by railways.

Rid'ley, Nicholas, abt. 1500–55; English bishop; b. Unthank, Northumberland; became domestic chaplain to Archbishop Cranmer, 1537; vicar of Herne, Kent, 1538; a prebendary of Westminster, 1545; bishop of Rochester, 1547; of London, 1550. He assisted Cranmer in preparing the forty-two articles. In a sermon preached at St. Paul's Cross, Ridley espoused the cause of Lady Jane Grey, and warned the people of the evil that would follow to Protestantism if Mary should come to the throne. On her accession he was committed to the Tower (July, 1553). In April, 1554, he was taken to Oxford, and adjudged a heretic. After many attempts to induce him to recant, he was led to the stake with Latimer.

Ridol'fo, Zeno. See SCHADOW, RUDOLPH.

Riedesel (rē'dē-zĕl), **Friedrich Adolph** (Baron von), German general in British service; b. Lauterbach, Hesse; 1738–1800. On June 1, 1776, he reached Quebec as major general of 4,000 Brunswick mercenaries; accompanied Burgoyne on his march to Albany; participated in the capture of Ticonderoga, and secured the British victory at Hubbardton. In the first action at Saratoga, September 19, 1777, by a timely forced march through the woods, he saved the army of Burgoyne from annihilation; and, had the latter followed his advice and retreated, he might have escaped. After the second engagement, October 7th, Riedesel was a prisoner till 1780, when he was exchanged, and Clinton placed him in command of Long Island. He returned to Germany, 1783; wrote "Letters and Military Journals in America."

Riel (rē-ĕl'), **Louis,** 1844–85; Canadian insurgent; b. St. Boniface, Manitoba; son of half-breed leader of Metis Indian rebellion; protégé of Archbishop Taché; educated in Montreal; joined native tribes against the establishing of Canadian authority in the territory belonging to the Hudson Bay Company; became president of Metis provisional government at Fort Garry, NW. Territory; led Red River rebellion, 1869; elected to Dominion Parliament, 1873, but not seated; warrant of outlawry issued against him, and sentenced to five years' banishment; led another rebellion, 1885, and the second time established a provisional government, but was captured, tried for treason, and executed at Regina. He was probably insane.

Rienzi (rē-ĕn'zē), or **Rienzo, Cola di,** abt. 1313–54; Italian political reformer; b. Rome; early conceived the idea of restoring the ancient greatness of the city; proposed, May,

1347, the establishment of a better form of government; proclaimed tribune of the "Holy Roman Republic"; forced the nobles to render him allegiance, and changed a condition of anarchy to one of order. He now seemed to aim at universal empire. The Roman populace grew tired of his magnificent processions and of his taxes; the papal legates declared him a traitor and a heretic, and seven months after his accession to power the nobles drove him from the city. He again appeared in the rôle of a political reformer at the court of Emperor Charles IV, who sent him as a prisoner to the pope at Avignon. Hoping to restore peace at Rome, where, during the reign of the nobles, things were worse than ever, Innocent VI sent Rienzi thither in the quality of a senator. In August, 1354, he made a sort of triumphal entry, but soon displayed the same fantastic arrogance, accompanied by caprice and cruelty. The nobles never acknowledged his government, the populace became infuriated by his arbitrary measures, and a crowd surrounded him on the stairs of the capitol and killed him.

Riesengebirge (rē'zèn-gē-bĭrkh'ē), German, "Giant Mountains," mountain range which, for a distance of about 50 m., forms the boundary between Bohemia and Prussian Silesia; is continued on the W. by the Erzgebirge, and on the E. by the Sudeten; highest peak, Schneekoppe, 5,253 ft.

Rif, region of high mountains fronting on the Mediterranean, between Tetuan and Melilla, Morocco. The mountains are well wooded with wild olive and cork trees. Grain is grown in the rich valleys, and the natives, partly Berber and partly Arab tribes, are well-to-do and fine people physically, but so extremely fanatical that their country has not been satisfactorily explored, though lying near Europe. They are frequently in trouble with the government, as they often refuse to pay taxes.

Ri'fle Bird, name applied by the early Australian settlers to the birds of paradise of the genus *Ptilorhis,* on account of the fancied resemblance of their plumage to the colors of the rifle brigade. The plumage of the male is black with beautiful steely blue and green reflections. These are particularly brilliant on the lower part of the throat. The general color of the female is brown. *P. paradisea* is found in New S. Wales, and other species occur in other parts of Australia and in New Guinea.

Ri'fling of Ord'nance, system of grooves in the bore of a firearm designed to give rotary motion to the projectile. The adoption of oblong projectiles necessitated some device to keep them point first in the air, and this can be done only by giving to the projectile a motion of rotation about its longer axis sufficient to counteract the tendency to rotation about its shorter axis. The rifling consists of a number of spiral grooves separated by lands; into them fits the rotating device on the projectile, which compels it to rotate while it is being fired. The studded system of projectiles requires deeper grooves than the other systems, and the number of grooves must be the same as the number of rows of studs.

By the twist of the rifling is meant the angle made by the tangent to the rifle curve with the axis of the bore. The twist may be uniform or increasing. *Uniform twist* was the kind first employed. It has the advantage of simplicity, and the projectile leaves the muzzle of the gun with a steady flight. The disadvantage of the uniform twist is that the pressure on the rotating device is not uniform at all points in the bore. The *increasing twist* has, on account of objections, been adopted in the guns of larger caliber. With the increasing twist there is a gradual change from little or no twist at the beginning of the rifling to the maximum twist at or near the muzzle. When the grooves start almost parallel to the axis of the bore, the initial resistance to the starting of the projectile is reduced to a minimum. The object is to select such a rifle curve that its twist will increase as the powder pressure falls off, and thus keep constant the pressure on the rotating device.

Riga (rē'gā), capital of former government of Livonia, Russia; on the Dwina; 350 m. SW. of Petrograd. The fortifications of the city have been razed and the walls converted into promenades, which surround the old city, separating it from its suburbs. The former has narrow streets and mediæval houses, while the latter are laid out in broad streets with modern buildings. Among the public buildings the most notable are St. Peter's Church (1406), with a tower 460 ft. high; the governor's residence (1494–1515), the city hall, and the exchange. There are manufactures of cotton, woolen, linen, and iron goods, cigars, corks, spirits, oil, glass, paper, jute, etc., and the shipbuilding industry is very flourishing. Riga derives its greatest importance, however, from its commerce. An average of 2,400 vessels, of over 1,000,000 tons, enter its harbor annually. The city was founded in beginning of the thirteenth century by Albert von Apeldern, Bishop of Livonia. He established the order of the Knights of the Sword, which within a few years was united to the order of the Teutonic Knights. The prosperity of Riga began when it became a member of the Hanseatic League. It was taken by Gustavus Adolphus, 1621; incorporated with Russia, 1710; and in the World War, after having long been coveted by the Germans, was occupied by the army under Prince Leopold of Bavaria, Sept. 3, 1917.

Riga, Gulf of, inlet of the Baltic; 100 m. long, 80 m. broad; bounded by the former Russian governments of Kurland, Livonia, and Esthonia; receives the Dwina; Oesel is a large island at its entrance. In the World War the Germans occupied the Oesel and Dagö islands in the Gulf, Oct. 12, 1917, and defeated the Russians in a naval fight here, Oct. 17 following.

Riggs, Kate Douglas (WIGGIN), 1857– ; American author; b. Philadelphia, Pa.; taught kindergarten methods in Santa Barbara (Cal.) College; founded in San Francisco the first free kindergarten W. of the Rocky Mountains; aided in organizing California Kindergarten Training School; married Samuel Bradley Wiggin, 1880, and removed to New York City; in 1895, after his death, married George Chris-

topher Riggs; resides in summer at Hollis, Me. Works include "Kindergarten Chimes," "The Birds' Christmas Carol," "Children's Rights," "A Cathedral Courtship," "Timothy's Quest," "Penelope's English Experiences," "The Kindergarten," "Nine Love Songs and a Carol," "The Diary of a Goose Girl," "Rebecca of Sunnybrook Farm," "More Chronicles of Rebecca," "Rose o' the River." In connection with her sister, Nora A. Smith, she has published "The Story Hour," "Froebel's Gifts," "Froebel's Occupations," etc.

Right Ascen'sion, in astronomy, the angular distance between the first point of Aries and the point in which the circle, passing through a heavenly body and the poles of the heavens, intersects the celestial equator. It is always measured from W. to E., and corresponds to longitude on the earth, as declination corresponds to latitude. Right ascension is usually expressed in time, one hour corresponding to 15° on the celestial sphere.

Rights, Bill of. See BILL OF RIGHTS.

Rigi, or **Righi** (rē'gē), mountain of Switzerland; canton of Schwytz; isolated between the lakes of Zug and Lucerne; rises 5,902 ft. above the sea, 4,500 ft. above the lake. Several carriage roads and two railways lead from the base of the mountain to the top, which offers a very extensive view.

Rig'or Mor'tis (Latin, "stiffness of death"), the condition of muscular rigidity developing shortly after death. In persons who die suddenly, as by accident or by heart disease, and in whom the muscles are well developed, rigor mortis may be postponed for many hours—twelve or twenty-four—and may then persist for two or three days. Reversely, when death is the result of exhaustive disease, the muscles are flabby, rigor mortis develops speedily—within an hour—and is of brief duration. As soon as rigor mortis passes off, the relaxed body begins to decompose. Rigor mortis is believed to be due to the separation and coagulation of the albuminoid substance in the fluid of the muscle, following the cessation of nutrition.

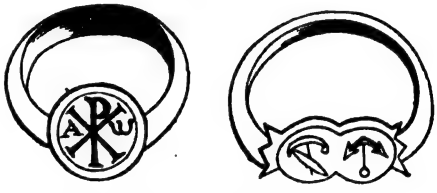
Rime. See RHYME.

Rimini (rē'mē-nē), ancient *Ariminum*, town of Forli, Italy; at mouth of the Marecchia in the Adriatic; 30 m. SE. of Forli; contains one of the largest and finest theaters in Italy, and celebrated antiquities, including a bridge of fine white marble at the junction of the Via Flaminia and Via Æmilia. The remarkable Church of San Francesco was built by Pandolfo Malatesta, whose family ruled here from the thirteenth to the sixteenth century. The town after 1528 was included as papal territory in the so-called legation of Ravenna, until, 1860, it was united to the Kingdom of Italy. Pop. (1901) 43,203.

Rin'derpest, Cat'tle Plague, or **Steppe Mur'rain**, contagious eruptive fever among cattle, endemic or nearly so in Russia, and occasionally sweeping most destructively throughout Europe. It resembles smallpox in its symptoms and progress. It is not confined to neat cattle, but attacks nearly all other ruminant mammals, and even some others. The best treatment is the prompt destruction of all diseased animals. From thirty to ninety per cent of the afflicted die under any treatment.

Rine'hart, William Henry, 1825–74; American sculptor; b. Carroll Co., Md.; resided in Florence, Italy, 1855–58; returned for a time to Baltimore, and then settled in Rome; best works, a "Nymph," "Woman of Samaria," "Indian Maiden," "Rebecca," "Endymion," "Atalanta," "Hero," "Leander," "Antigone," "Clytie," and "Latona." He completed the bronze doors of the U. S. Capitol, begun by Crawford.

Ring, ornament worn on the finger, frequently invested with symbolical meaning. From

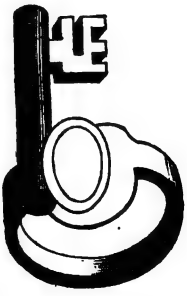


RINGS SYMBOLIC OF CHRISTIAN FAITH.

the remotest antiquity the finger ring (usually connected with a seal) was an emblem of an authority which could be delegated by the sim-

EARLY SEAL RING.

ple process of delivering it to an agent. The cases of Pharaoh and Ahasuerus are instances in point. Precious stones of great value were employed in rings by the Hebrews and Persians, and later by the Greeks and Romans. They have long been in almost universal use in Christendom as tokens of marriage or betrothal, and are often engraved with mottoes. The "fisherman's ring" is an indispensable article of the papal chancery, and the custom has been imitated by the bishops of some Christian churches. Magical virtues have often been ascribed to rings both by pagan and Christian nations, and traditions of poison concealed in rings have played a large part in the criminal annals of the Middle Ages.



RING WITH KEY.

Ring'bone, bony tumor on the coronet of the horse, most common on overworked horses, but sometimes seen on colts, or even newly dropped foals. Ringbone is practically incurable.

Ring'worm, parasitic skin disease occurring most frequently among children and upon the face and neck. It is technically called *Tinea circinata*, and is analogous to barber's itch. These diseases are due to a parasitic growth which invades the hair follicles and excites inflammation of the skin. Ringworm is contagious, not only from person to person by contact, but in the uncleanly is transplanted from spot to spot on the head and hands or wrists. The treatment is by remedies destructive to parasitic life; local application of tincture of iodine, sulphur dry or in ointment, carbolic acid, creosote, oil of cade, mercurial ointment, solution of corrosive sublimate, etc.

Ri'o Bran'co. See RIO NEGRO.

Rio Bra'vo. See RIO GRANDE.

Rio de Janeiro (rē'ō dā zhā-nā'ē-rō), capital and most important port of Brazil; largest city of S. America; on bay of same name, perhaps the most magnificent harbor in the world. The entrance, between high rocks, is about a mile wide and perfectly clear; within, it expands into a broad sheet with many bays, stretching inland for 17 m., the whole surrounded by mountains and hills, with the needlelike pinnacles of the Serra dos Orgaos at the N. end. The city occupies flat land and hills partly surrounding a group of wooded mountains. The finest dwellings, surrounded by gardens, are in the outskirts and on the hills. There are several public parks, including the beautiful Passeo Publico, and the Botanical Garden in the suburbs. The handsomest church is the Candelaria. There are several hospitals, well-appointed observatory, national and several other libraries, polytechnic school, national college, schools of medicine, fine arts, etc., and a naval school. The bay is defended by several forts, and there is an extensive navy yard. Rio de Janeiro exports more than half of the total coffee product of the world. The largest exports, especially of coffee, are to the U. S.; most of the imports are from Europe. Regular steamers run to the U. S., Europe, the W. coast of S. America, New Zealand, etc. Yellow fever is generally prevalent during the warm months, and at intervals there are severe epidemics. The bay was discovered (probably) by Joao Manoel and Amerigo Vespucci, January 1, 1502. French Protestants tried to form a settlement on it, but were driven out, 1567, by the Portuguese, who then founded São Sebastiao, or Rio de Janeiro. It became the capital of S. Brazil, 1762, and of all Brazil, 1774. In 1808–21 it was the residence of the Portuguese court, and hence the capital of Portugal. The Municipio Neutro, which includes the city, is a federal reservation, similar in character and government to the District of Columbia in the U. S.; est. pop. with city (1906) 811,265.

Rio de la Pla'ta. See PLATA, RIO DE LA

Rio Grande, or Rio Grande del Norte (grän'-dā dĕl nōr'tā), Spanish, "great river of the north," large river; rises in SW. Colorado, flows E. and S. through New Mexico, thence SE., forming for several hundred miles the boundary between the U. S. and Mexico, and falls into the Gulf of Mexico after a course of about 1,800 m.; is navigable for small boats only for about 450 m., or to Kingsbury Rapids; is generally shallow, and frequently interrupted by rocks and cataracts. Its principal tributary is the Rio Pecos. Brownsville, Tex., and Matamoros, Mexico, are on opposite sides of the Rio Grande, 35 m. above its mouth.

Rioja (rē-ō'hä), **Francisco de,** abt. 1585–1659; Spanish poet; b. Seville; entered the Church, but, 1621–43, lived at Madrid as counselor of Olivares, the Prime Minister, librarian of the royal library, and for a time chronicler of Castile. From 1654 until his death he was counselor in the Supreme Court of the Inquisition. His poems are not numerous, but all are marked by beauty of form, delicacy of style, and deep feeling for nature.

Ri'o Negro (nā'grō), river in the region of the Argentine Republic known as Patagonia; rises in the Andes, flows NE., E., and ESE., and enters the Atlantic near lat. 41° S.; length about 650 m.; nearly the whole course is said to be navigable. RIO NEGRO is also the name of an important tributary of the Amazon; rises in S. Venezuela and (after entering Brazil) keeps a general ESE. course to its mouth in lon. 59° 58′ W.; length about 1,350 m.; lower course broad and lakelike, and navigable for about 600 m. Above this about 20 m. are obstructed by rapids. Above the rapids it is connected by the Cassiquiare with the Orinoco. The principal W. branch is the Uaupés, rising in the Colombian Andes, probably over 700 m. long, and navigable.

Ri'ot, at common law, a disturbance of the peace by three or more persons acting in concert and in a manner calculated to inspire terror. Many text writers declare that the riotous enterprise must be of a private nature, and that if it is of a public nature it amounts to treason; but there is judicial authority for the view that a tumultuous disturbance of the peace is punishable as a riot, although engaged in for the purpose of showing an unlawful opposition to the government. An *unlawful assembly* is the meeting of three or more persons with a riotous purpose. If they enter upon the execution of that purpose, yet fall short of an act amounting to a riot, their offense is a *rout*. Modern legislation has modified the common-law rules governing these three offenses.

Riou-Lingga (rē-ow'-lĭng'gä), archipelago of the China Sea; extension of the Malay Peninsula; belonging to the Dutch, and forming part of the residency of Riou; formed of two groups of islands, that of Riou being the N. and adjacent to Singapore, and Lingga the S.; area of whole archipelago estimated at 16,301 sq. m.; pop. (1905) 112,216. The islands are mountainous and covered with thick and valuable forests; chief productions: sago, rice, pepper, and gambier; tin has long been mined; inhabitants mainly Malays, Chinese, Klings, and Javanese, with a few Europeans.

Ripa'rian Rights, rights that appertain to the ownership of land on the banks of rivers and other natural water courses. Thus defined, the expression would include the rights enjoyed by riparian proprietors over the public streams by which their lands are bounded (such as the right of access, of wharfage, of ferriage, etc.), as well as those mutually exclusive rights of user in the private streams, whose beds are the property of the adjoining owners. The expression is sometimes, however, loosely used to describe all of the rights, whether of the public or of adjoining owners, which the law recognizes in any public or private waters. By the common law a riparian owner owned the bed of a nonnavigable stream to its center. He could make reasonable use of the waters, but could not divert or pollute them.

Rip'ley, George, 1802–80; American critic and journalist; b. Greenfield, Mass.; pastor of a Unitarian church in Boston, 1826–41; chief promoter of the socialistic experiment at Brook Farm, Roxbury, Mass., 1841–47; associated with Emerson and Margaret Fuller in conducting *The Dial*, 1840–41; one of the editors of *The Harbinger*, a Fourierite organ, 1844–48; removed to New York City, 1847; literary editor New York *Tribune* from 1849 until his death; published (with Bayard Taylor) "Handbook of Literature and the Fine Arts"; edited (with Charles A. Dana) "The American Cyclopædia."

Rip'on, George Frederick Samuel Robinson (first Marquis of), 1827–1909; British statesman; b. London; succeeded his father as Earl of Ripon and Viscount Goderich, 1859, resigning a seat in Parliament; Under Secretary for War (and for a short time in India), 1859–63; Secretary for War, 1863–66; of State for India, 1866; President of Council, 1868–73; chairman of high joint commission which negotiated Treaty of Washington, 1871; rewarded with title of marquis; Grand Master of Free Masons of England, 1870–74; resigned, and was received into Roman Catholic Church. He was Governor General of India, 1880–84; First Lord of the Admiralty, 1886; Colonial Secretary, 1892–95; Lord Privy Seal, December, 1905.

Rip'ple Marks, wavy surface produced on sands or other granular material by the passage of a current of air or water; seen in great perfection and beauty on dunes, where the crests of the wavelets are usually a few inches apart; appear on a much larger scale, with crests several feet or even yards apart, on barren, wind-swept slopes of volcanic cinders; appear on beds of streams, not only under continuous current but in embayments where the water sways to and fro; and are extensively developed on sandy coasts, in shoal water. The surfaces of sandstone layers frequently exhibit ripples identical with those observed along shores, and show that the sand composing the sandstone was deposited in a zone of active currents and presumptively in shallow water.

Rip'rap, deposit of loose angular stones of large size, used for constructing a breakwater, or as a protection to piles and piers.

Risto'ri, Adelaide, 1822–1906; Italian actress; b. Cividale, Friuli; daughter of humble comedians; at twenty had attained distinction at Parma; later was successful at Leghorn; early talent was in comedy; favorite pieces were the plays of Goldoni. In 1847 she married Marquis Capranica del Grillo. During the siege of Rome, Ristori left the stage for the hospitals, and there labored as a Sister of Charity. In 1850 she reappeared, and for several years played in Italian cities as *Myrrha*, *Francesca di Rimini*, and *Mary Stuart*. In 1856 she made her *début* in Paris, where she met with great success; later appeared in Spain, Holland, St. Petersburg, Berlin, Constantinople, the U. S., and S. America; most popular plays in U. S., "Queen Elizabeth," "Marie Antoinette," and "Mary Stuart"; played also *Judith*, *Medea*, *Lucrezia Borgia*, etc.

Rip Van Win'kle, hero of a story in Washington Irving's "Sketch Book." He is a genial, henpecked, good-for-nothing fellow in a small Dutch village near the Hudson. He takes to the forest in the Catskill Mountains to escape from his scolding wife, and there meets Hendrick Hudson and his ghostly crew of the *Half Moon*. Rip waits on them, but through drinking of their liquor he falls into a sleep which lasts twenty years. When he awakes he returns to the village to find his wife dead, his house in ruins, and his little daughter grown up and married. He left as a subject of King George; he is now a citizen of the U. S. Some of his old friends recognize him, and he lives on in quiet ease. Boucicault's dramatized version of the story was made famous by Joseph Jefferson's acting in the title rôle.

Rite, term which designates not merely a religious ceremony, but the aggregate of such ceremonies or the ritual system of any church. Thus there is the Latin and the Eastern rite, and the Latin rite has some minor rites. The Ambrosian rite in N. Italy had more than 1,000,000 followers as late as the latter half of the nineteenth century; the Mozarabic rite in Spain had a limited use, etc. See RITUALIST.

Rites, Congrega'tion of, department of the administration of the Roman Catholic Church; first organized by Pope Sixtus V, and consisting originally of six cardinals and a corresponding number of secretaries and consultors. Everything belonging to the liturgy, the rites of the administration of the sacraments, the ceremonies of the Church, the beatification and canonization of saints, etc., falls under its jurisdiction.

Ritschl (rĭtsh'l), **Friedrich Wilhelm,** 1806–76; German classical scholar. After attending the gymnasiums at Erfurt and Wittenberg, went to Leipzig and Halle, where he devoted himself to classical studies; appointed, 1832, extraordinary professor at Halle Univ. Subsequently held professorships at Breslau and Bonn, and in 1865 accepted a call to Leipzig Univ., where he remained until his death.

Rit'tenhouse, David, 1732–96; American astronomer and mathematician; b. near Germantown, Pa., where about 1690 his great-grandfather, William Rittinghuysen, a Hollander,

established the first paper mill in America; discovered for himself the method of fluxions when in his nineteenth year; undertook clockmaking as a profession, 1751; afterwards made a large orrery for the Univ. of Pennsylvania; in connection with Mason and Dixon was employed, 1763, to determine the initial point of their survey, which he did with instruments of his own construction; fixed the N., S., and W. boundaries of Pennsylvania; appointed by American Philosophical Society to observe the transit of Venus, June 3, 1769; calculated the elements of the (future) transit of December 8, 1874, and observed the transits of Mercury of 1769 and 1782. In 1770 he settled at Philadelphia, where he engaged in the manufacture of clocks and mathematical instruments; elected to the provincial legislature, 1776; member of convention which formed the state constitution, 1776; state treasurer, 1777–89; director U. S. Mint, 1792–95.

Rit'ualist, strictly speaking, one who has made the rites and usages of the Church a matter of study; but the term is commonly used to designate a party in the Anglican Church which seeks to minimize the effect of the Reformation, which is regarded by them as a "deformation," and, in order to show sympathy with the ante-Reformation Church, and to make prominent doctrines which they regard as "Catholic," has revived rites and practices which have their origin in the mediæval days. The Ritualists style themselves simply Catholics, but are popularly known as the High Church party. The Church Association was formed for their prosecution, culminating in the celebrated trial of the Bishop of Lincoln for alleged ritualistic practices, which terminated in a practical victory for the bishop and his sympathizers. From the Church of England, ritualism extended to her daughter in the U. S., and has occupied the attention of more than one general convention. In 1871 a canon forbidding certain practices was adopted which proved practically inoperative. There has not been found to any extent that development of ritual which tends to the inculcation of Roman Catholic doctrine.

Rit'ual Law, law governing the ritual or sacred offices of the Church. The term is applied broadly to include the rules governing the offices and the manner of celebrating religious services in the church of any denomination, but usually and more specifically to such laws relating to an established church.

In Great Britain there is a common law of the Church, which is a part of the general common law, and is binding as well in the temporal as in the ecclesiastical courts. It is a part of the canon law, and rests for its authority on immemorial usage. The ritual laws or rules of a church organization or body in the U. S. have no force as public laws, and cannot be enforced except by exercising the discipline provided for their enforcement by the rules of each particular organization. A person disciplined has a right to appeal to the courts of the law to enforce his legal rights in the organization and protect him from any discipline or punishment which violates either the law of the land or his rights under the regulations of the church organization to which he belongs.

Ritual of the Dead, or **Book of the Dead,** collection of sacred writings of the Egyptians which were placed on the walls of tombs and pyramids, on sarcophagi, and on various articles of funereal furniture, or on papyri which were deposited with the mummies. The general view made Thoth the author of this as of other sacred writings. A text of the twenty-sixth dynasty contains 165 chapters. In a complete compilation the number would be much greater.

The book, as a whole, is not properly a funeral ritual, since the acts prescribed are only in part to be done to or for the dead. Aside from certain ceremonial observances and directions, the book is concerned with the journey of the dead through Amenti, the W. region of the departed; with the speeches and prayers which he is to address to the gods and other beings whom he will meet in the course of his migrations; with the magical formulas which are calculated to deliver him from the ills and dangers that threaten; with the formulas which were placed on amulets to insure the safety of his bodily members; with the hymns to be sung in honor of the great gods; and with the scenes of the judgment in the hall of Osiris when the heart of the deceased is weighed in the scales over against the symbol of truth and justice, and where the "negative confession" that the deceased has *not* committed certain reprehensible or heinous acts of irreligion or of immorality is repeated to the forty-two assessors.

Riu Kiu (ry-ō' ky-ō') **Islands** (formerly called LIUKIU, or LOOCHOO), group in the N. Pacific Ocean, extending SW. from Kiushiu, Japan, toward Formosa, the most important of which belong to the prefecture of Okinawa, Japan; length about 80 m.; average breadth, 12 to 15 m.; pop. abt. 455,000. Okinawa-shima, or Great Liukiu, the largest of the islands, is about 65 m. in length by 15 m. in average breadth. Oshima is the only other island of considerable size; there are some fifty-three smaller islands. Capital, Shiuri, in Okinawa. The climate is agreeable and the soil fertile. China conquered these islands at an early date, but never enforced her claim, and Japan formally annexed them, 1879.

Riv'er, large stream by which the water gathered from a catchment area or basin, bearing with it the waste of the land surface, is led to lower ground, usually to the sea. All those streams which unite in a single trunk constitute a river system. As the volume of a typical river is supplied only by the rainfall over its basin, those streams and rivers near the seacoast whose volume is dependent on the inflow of the tide are tidal rivers; those, like the lower Delaware or Hudson, whose volume depends on the submergence of their lower valleys beneath sea level are estuaries or fiords; while those strips of salt water included between the mainland and adjacent linear sand bars, as Indian and Banana "rivers" on the Florida coast, are lagoons, not rivers.

A new river begins its life either on the surface of a newly raised land area, or on an old

land whose surface has been so deformed by mountain growth as to extinguish all preëxisting rivers. The surface rivulets of wet weather and the slow-creeping underground water follow the new slopes, and gather to form streams, the ground water emerging in springs at the head of the streams and also along the stream channels. A river of good size soon cuts down its valley close to sea level, or base level, and on thus assuming a gently sloping course it enters its adolescence. Adolescence of the trunk stream is characterized by the wearing away of the youthful waterfalls, and the attainment of a slope on which the ability of the river to do work is just equal to the work that it has to do. The river course is then said to be graded.

During all the time of river growth most of the land waste that has been carried down to the river mouth accumulates there, forming a delta, while the finest waste is carried out to deeper water. As the delta grows forward there is necessarily a slight building up all along the flood plain in order to maintain the needed grade of the river, and this entails an extension of the flood plain up the valley, particularly at that stage of river life when the load is increasing. Hence this valuable portion of the river valley increases its area, tempting occupation from its fertility, but, like the delta, subject to floods.

When the region drained by a river system is evenly uplifted, a new strip of land is added outside of the former coastline, and the old trunk river is extended across this strip to a new mouth. By such extension it often happens that several formerly separate rivers are ingrafted on a single new trunk.

When the climate of a region turns from humid to arid the supply of a river system weakens, the head waters shorten, and the volume diminishes. In crossing lowlands the river is further lessened by evaporation, so that it may at last disappear, though its course to the sea remains open. Withered rivers of this kind are found in the Argentine Republic, where they fail to reach the ocean, although the country slopes forward from their lower ends. Many withered rivers are found in the Great Basin of the U. S., where the side streams from the mountains are unable to reach their former trunk stream, while the dwindling trunk stream fades away on the desert plains.

During the occupation of a country by an ice sheet there is a peculiar drainage system on and under the ice. Streams fed by rains and surface melting in summer flow for a time on the surface, and then disappear by plunging down crevasses; they emerge from tunnels at the ice margin, sometimes bursting out with much energy, and bearing a heavy load of coarse and fine detritus, or broken-up material, which they spread out in their further course. The most striking glacial accidents in river history are found after the retreat of the ice when the streams again take unconstrained possession of it. The preglacial stream lines are more or less obstructed, and hence the post-glacial streams often lose their way, being here detained in an eroded basin or in a hollow behind a drift barrier, and there turning across an old divide or spur along a new line of flow. Streams thus affected are as a rule characterized by frequent lakes and long reaches alternating with rapids or gorges along their new courses. The economic value of the rapids and falls thus produced is very great; nearly all the manufacturing cities of New England are located at water powers of this accidental origin; Ottawa, Rochester, and Minneapolis are similarly determined.

WORLD'S LARGEST RIVER SYSTEMS.

River.	Area of Basin, sq. m.	Length, in m.
Amazon	2,230,000	3,400
Kongo	1,540,000	2,600
Nile	1,290,000	3,700
Mississippi	1,290,000	4,100
Niger	1,060,000	2,600
Obi	1,190,000	3,200
La Plata	995,000	2,300
Lena	942,000	2,900
Yang-tse-kiang	880,000	3,200
Yenisei	689,000	3,200
Mackenzie	607,000	2,300
Volga	592,000	2,200
Ganges and Brahmaputra	588,000	1,800
Zambesi	570,000	1,600
St. Lawrence	565,000	2,400
Winnipeg-Nelson	504,000	1,500
Yukon	433,000	2,200
Orinoco	430,000	1,400
Amur	403,000	2,800
Hoang-ho	387,000	2,500
Indus	360,000	1,900
Danube	320,000	1,700
Murray	300,000	1,500

Rivera (rē-vā'rä), **José Fructuoso,** abt. 1790–1854; Uruguayan politician; b. Paysandú; leader in the civil wars; after Uruguay became independent, was the first regularly elected President, 1830–35; 1836, revolted against his successor, Oribe, heading the Colorados party; again President, 1838–42. Then Rosas, dictator of Buenos Aires, aided Oribe, who began the "nine years' siege." Rivera was defeated, 1845, by Urquiza, Oribe's ally. In 1853 Rivera aided in the deposition of Giro at Montevideo, and became a member of the executive triumvirate.

River Bull'head. See Miller's Thumb.

Riviera (rē-vē-ā'rä), "the shore," name given to the coast of Liguria, Italy, from the French frontier to the Cape of Porto Venere, near Spezia; celebrated for its natural beauty and the salubrity of its climate. It is customary to divide it into the E. Riviera (Riviera di Levante) and the W. (Riviera di Ponente), the two meeting at Genoa.

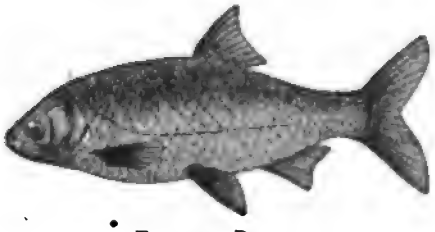
Riv'ington, James, abt. 1724–1802; royalist printer of New York City during the Revolution; b. London; 1761, opened a book store in New York City. On April 22, 1773, he established the New York *Gazetteer*, in which he advocated the cause of the English Govt. with great zeal. In November, 1775, in consequence of his assaults on Capt. Isaac Sears, that officer went from Connecticut with seventy-five horsemen, destroyed Rivington's press, and converted the types into bullets. In October, 1777, the city being occupied by the British, he re-

sumed the publication of his paper under the old title, afterwards changed to the *Royal Gazette*. After the evacuation he changed it to *Rivington's New York Gazette and Universal Advertiser*, but his business rapidly declined, and his paper was soon stopped.

Rix Dol'lar, silver coin formerly used in the Scandinavian countries and Germany; value varied in the different countries from a little less than forty cents to a little more than a dollar.

Rizzio, or **Riccio** (rĭt'sē-ō; rēt'chō), **David,** abt. 1533–66; favorite of Mary, Queen of Scots; b. Turin, Italy; son of a poor musician; went to Scotland in the suite of an ambassador; was made by Mary one of her pages, and, 1564, her secretary for the French language. On her marriage with Darnley he was appointed keeper of the privy purse. His rapid promotion, arrogance, avarice, and low birth excited the envy and anger of the nobles, who aroused Darnley's jealousy by accusing him of illicit intimacy with the queen. A conspiracy was formed, and he was stabbed while at supper with Mary, dragged into the antechamber, and despatched with more than fifty wounds.

Roach, fish of the carp family and genus *leuciscus*. The common roach of Europe (*L. rutilus*) is from 10 to 15 in. long; the upper part of the head and back dusky green with blue reflections, lighter on the sides, and silvery



EUROPEAN ROACH.

white below and on the cheeks; found in large shoals in the still rivers and lakes of temperate Europe, and feeds on worms and aquatic plants. The silvery dace of New England resembles the European fish, and is often called roach.

Roach. See COCKROACH.

Road, Law or Rule of the, the law governing the meeting or passing of travelers on the highways; the rules governing the steering, sailing, etc., of vessels meeting or passing upon navigable waters. The chief rules of the road on land are: When two vehicles meet, each must bear to the right in the U. S., to the left in Great Britain. In general, of vehicles following paths that cross, the one first to reach the point of meeting has the right of way. In Great Britain, when one vehicle overtakes another, the foremost gives way to the left, and the other passes on at the right. For pedestrians, the rule on both sides of the Atlantic is to keep to the right.

The rules governing the meeting, crossing, etc., of vessels at sea, and the precautions required to avoid collision, have become a matter of international importance. The following are some of the rules prescribed by the law enacted by the U. S. Congress to carry out the provisions of the recommendations of the International Maritime Conference of 1889, as proclaimed by the President, 1896: (1) When two sailing vessels approach, so as to involve risk of collision, (*a*) a vessel running free shall keep out of the way of a vessel closehauled; (*b*) a vessel closehauled on port tack shall keep out of the way of a vessel closehauled on starboard tack; (*c*) when both are running free, with wind on different sides, the vessel with wind on port shall keep out of the way of the other; (*d*) when both are running free, with wind on the same side, the one to windward shall keep out of the way of the other; (*e*) a vessel with wind aft shall keep out of the way of the other. When a steam vessel and a sailing vessel are proceeding so as to involve risk of collision, the steam vessel shall keep out of the way of the other. Every vessel overtaking another shall keep out of the way of the overtaken vessel. In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of fairway or midchannel which lies on the starboard side of such vessel. Where by any rule one vessel shall keep out of the way of the other, the latter shall keep her course and speed, and the former, if the circumstances of the case admit, shall avoid crossing ahead of the other.

All signals prescribed for vessels under way shall be given by steam vessels on the whistle or siren; by sailing vessels and vessels towed, on the fog horn. Steam vessels must indicate their course by one short blast for "I am directing my course to starboard"; two short blasts, "I am directing my course to port"; three short blasts, "My engines are going full speed astern."

Roads, highways in the country and the streets in villages and small towns, often called common roads to distinguish them from paved city streets and from railways. The Romans built many roads extending to all parts of the empire, and portions of some of these are now in fair condition. Twenty-nine military roads centered at Rome, which with their numerous branches had a total length of 52,964 Roman miles. The most important of these had a paved width of 16 ft., with curbs and unpaved sidewalks, but the prevailing width was 8 ft. The military roads were essentially pavements of dressed stone blocks, laid with close joints on a foundation of concrete which rested on a subfoundation of large flat stones, the entire thickness being about 3 ft. The early explorers of Mexico and Peru found excellent roads between the principal towns. One of the military roads of Peru is said to have been nearly 2,000 m. long, with tunnels through mountains and bridges or ferries over streams; this was 20 ft. wide and paved with flagstones covered with bitumen.

The earliest roads in the U. S. were mere Indian trails along water courses and through gaps in mountain ranges. In New England the towns had control of roads. The prevailing method of construction, when any method at all was used, was to plow two parallel furrows

about 20 ft. apart and scrape the loosened earth on the space between them to form the roadbed. Turnpikes were maintained in the U. S. during the eighteenth century by private companies, which were allowed to collect toll, and the surface of these was often of gravel or broken stone. In 1796 Congress authorized a national road from Baltimore, which was built for 650 m. through Pennsylvania, Ohio, and Illinois; its width is 80 ft., of which 30 ft. is of broken stone, sometimes on a foundation of

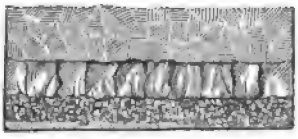


FIG. 1.

large stones. Among the famous roads of Europe may be mentioned that from Geneva, over the Simplon Pass of the Alps, to Milan, built by Napoleon as a military route, and which cost France about $3,250,000, or nearly $15,000 per mile.

The grades should allow easy traction and thorough drainage. The maximum grade for earth roads should be about ten per cent, that is, 10 ft. of vertical rise to 100 ft. of horizontal distance, while gravel roads may be limited to seven per cent, and macadam roads to about four or five per cent. On these grades a horse exerts twice as much force in pulling up the load as on a level. The width of roads in the U. S. has usually been too great; 16 ft. is sufficient, and it is better that this width should be kept in good condition than that 30 or 40 ft.

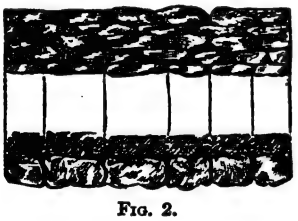


FIG. 2.

should be maintained in poor order. Near cities widths of 24 or 30 ft. are sometimes required. To these widths are to be added those necessary for gutters or ditches and for sidewalks. In order to render the road free from dust and mud and the traction easy to animals, some kind of road covering other than the natural soil is necessary. Gravel is often satisfactory when properly compacted or rolled on a good foundation.

The system of road making devised by Macadam in the early nineteenth century has been much used in the U. S. and Great Britain. The roadbed is excavated 8 or 10 in. and compacted by rolling. Successive layers of broken stone are then laid and each layer thoroughly consolidated. The top layer is generally composed of splinters or smaller stones, and this is made thicker at the middle than at the sides so as to give the proper transverse form. The system introduced by Telford is similar to that of Macadam, except that stone blocks are set in contact to serve as a foundation for the broken stone. The term "macadam road" is popularly applied to both systems. Fig. 1 is a part of a cross section of a road, showing a layer of stone blocks about 6 in. in depth, a layer of broken stone 4 in. deep, and a top layer of binding material 1 or 2 in. thick. The stone blocks are set in close contact, with the widest ends down, and rammed. The broken stone is applied in two or three thicknesses, each being thoroughly rolled while moistened. In Fig. 2 an arrangement of the stone blocks more suitable for soft soils is shown, the upper figure being a section across the road and the lower one a plan. In very soft soils concrete may be used as a foundation.

About 1885 public opinion in the U. S. began to be aroused, mainly through the influence of bicycle users, as to the deplorable condition of country roads, and with the introduction of the automobile the demand for better construction and repair became urgent. In 1900 a National Good Roads Association was formed in the U. S., and as a result a number of states enacted legislation creating state highway commissioners, and providing for general road improvement. Among the facts presented at the organizing convention was this: that it costs the farmers of the U. S. nearly three times more than it does those of Europe to market an equal tonnage of farm products over primary roads. See ENGINEERING; PAVEMENTS.

Roanoke', city in Roanoke Co., Va.; on Roanoke River; 90 m. WSW. of Richmond; in agricultural and iron-mining region; 950 ft. above sea level; surrounded by mountains. The industrial establishments include locomotive works, railway-car shops, iron and steel works, bridge works, foundries and machine shops, hydraulic-engine works, ice, canning and preserving, and paper-box factories, brickworks, and elevator factory. Pop. (census of 1910) 34,874.

Roanoke Riv'er, stream formed by union of the Dan and Staunton at Clarkesville, Va.; flows 250 m. ESE. into Albemarle Sound near Plymouth, N. C.; is a tidal stream to Halifax Falls, N. C., 75 m. from its mouth, and navigable 75 m. farther to Weldon by steamboats, and throughout its course by bateaux.

Roatan'. See RUATAN.

Rob'bery, larceny from the person of another by violence or putting him in fear. The force or fear must precede or accompany the larceny. The fear need not be of injury to the body of the person robbed. It has been held that a threat to injure another's character in order to induce him to surrender his property is a sufficient putting in fear. The courts have given to "the person" an extended meaning in the definition of robbery. Whenever the stolen property is so in the possession or under the control of an individual that violence or putting in fear is the means used by the thief to secure it, the taking is from the person. Accordingly, a thief commits robbery when he binds the owner in one room of his house and frightens him into telling where property is to

be found in another part of the building. Robbery was a capital felony at common law. It is punishable in Great Britain by penal servitude. In many of the U. S. it has been defined by statute and divided into degrees, punishable by imprisonment for periods of varying length. See BURGLARY; SORCERY.

Robbia (rŏb'bē-ä), **Andrea della,** abt. 1436–1525; Italian sculptor; b. Florence; nephew of Luca (see following article); works include marble decorations and colored reliefs in terracotta for Santa Maria delle Grazie and for the cathedral at Arezzo, and the loggia of the Hospital of the Innocents, Florence. His sons, GIOVANNI, LUCA, and GIROLAMO, also worked in his manner. Although the elder Luca was the founder of the art, Andrea undoubtedly was the most talented.

Robbia, Luca della, abt. 1399–1482; Italian sculptor; b. Florence; first a goldsmith; soon devoted himself to larger work in bronze and marble. Among his early works were basreliefs for the tomb of the wife of Sigismund Malatesta at Rimini and the bronze door of a sacristy in the cathedral at Florence. Having discovered a glaze that protected his work in clay from injury, he gave up bronze. A "Resurrection," now in the Academy of Fine Arts, Florence, is one of his first works in this medium. He afterwards found out how to give color to his ware. His fame spread throughout Europe, and his orders were innumerable—both for panels for the inner decoration of churches, as well as for outer walls above doorways, etc. His brothers, OTTAVIANO and AGOSTINO, aided him, and continued his works after his death.

Rob'ert I (King of Scotland). See BRUCE, ROBERT.

Robert II, 1316–90; King of Scotland; founder of the Stuart dynasty; son of Lord Walter Stewart; became joint regent with the Earl of Murray, 1334; sole regent, 1338–41, during the minority and absence in France of his uncle, King David II; again regent with the Earl of March, 1346–57; renewed his oath of fealty to David II, 1363; imprisoned, 1363–69; declared king after death of David, 1371; conducted two wars with Richard II of England, in the second of which the successful forays of Richard II and the Duke of Lancaster into Scotland took place. These were avenged, 1388, by an invasion of England by two armies, one of which won the celebrated battle of Otterburn, or Chevy Chase.

Robert III, abt. 1340–1406; King of Scotland; son of Robert II; succeeded, 1390; renewed the war with England, 1399; an imbecile ruler; left administration in the hands of his brother, Robert Stuart, Earl of Menteith, by whom the heir to the throne was imprisoned and starved to death. In 1400 occurred the invasion of Scotland by Henry IV of England and the retaliatory expedition of the Scots resulted in their terrible defeat at Homildon Hill, 1402.

Robert II (surnamed THE DEVIL), d. 1035; Duke of Normandy; son of Richard the Good; succeeded his brother Richard, 1028; supported Count Baldwin IV of Flanders against his sons, King Henry I of France against his mother, and his nephews, Alfred and Edward of England, against Canute of Denmark; made Normandy the most powerful state in France; was audacious, unscrupulous, and cruel; suddenly fell into melancholy; from Constantinople journeyed on foot to Jerusalem; at the Holy Sepulcher found consolation, but on return died suddenly at Nicæa. His only child, born to him by a mistress, was William the Conqueror, who succeeded him.

Robert (rō-bār'), **Louis Leopold,** 1794–1835; Swiss painter; b. canton of Neuchâtel; studied in Paris; gained a prize for engraving when twenty; 1818, went to Italy, where he worked and studied for years, and spent much of his life thereafter. His reputation was very high in France under Louis Philippe. At the Louvre are his pictures, "Return of the Pilgrimage to the Madonna de l'Arco," "A Roman Peasant Woman," and the well-known "Harvesters of the Pontine Marshes."

Robert-Fleury (-flē-rē'), **Joseph Nicolas,** 1797–1890; French historical and genre painter; b. Cologne, of French parents; second-class medal, Salon, 1824; first class, 1834, and first class, Paris Expositions, 1855 and 1867; commander Legion of Honor, 1867; member Institute, 1850; director French Academy in Rome, 1866. In 1833 he exhibited in Paris his "Massacre of St. Bartholomew," which at once gained him a high reputation. His "Conference at Poissy in 1561," "Jane Shore," and "Sack of a Jew's House," are in the Luxembourg Gallery, Paris.

Rob'ert Guiscard (gēs-kär'). See GUISCARD, ROBERT.

Robert of Gloucester (glŏs'tẽr), chronicler of English annals, of whose life nothing is known except that he was living at the time of the battle of Evesham (1265). His metrical chronicle of England from the time of the fabulous Brutus was chiefly based on Geoffrey of Monmouth's work. It extends to 10,000 lines, and is one of the earliest specimens of the English language.

Rob'erts, Frederick Sleigh (Lord), **1832–1914;** British field marshal; b. Cawnpur, India; entered the Bengal artillery, 1851; promoted to lieutenant general, 1883; served with great distinction in the Indian Mutiny, Abyssinian, and Afghan campaigns; commander in chief in India, 1885–93. His most noted exploit was the relief of Kandahar, 1880. The soldiers named him Bobs Bahadur, the latter word meaning hero, or champion. He was made field marshal, May 25, 1895, and commanded the forces in Ireland till 1899; commander in chief in S. Africa, 1899–1900; relieved Kimberley, February, 1900; turned over the S. African command to Lord Kitchener, November 30, 1900, and returned to England; created first Baron Kandahar, 1892; Viscount St. Pierre and first earl, 1901; commander in chief British army, 1901–4; author of "Rise of Wellington" and "Forty-one Years in India."

Rob'ertson, Frederick William, 1816–53; English clergyman; b. London; settled in Win-

chester, 1840–42; Cheltenham, 1842–47; Oxford, 1847, going that year to Brighton, where he died; works include "Sermons Preached at Trinity Chapel, Brighton," "Lectures and Addresses on Literary and Social Topics," "Expository Lectures on St. Paul's Epistles to the Corinthians," and "Notes on Genesis." He was one of the greatest and most inspiring of modern preachers, and exerted great influence in liberalizing religious thought. He is usually, although perhaps erroneously, classed with Maurice and Stanley as a founder of the modern Broad Church party in the Church of England.

Robertson, Thomas William, 1829–71; English dramatist; became an actor in a traveling company of which his father was manager; produced a play, "A Night's Adventure," 1851; settled in London and devoted himself to literature, 1860, and wrote several successful dramas, including "David Garrick," "Society," "Ours," "School," and "Dreams."

Robertson, William, 1721–93; Scottish historian; b. Borthwick; became minister of the Scottish Church at Gladsmuir, 1743; joint minister at Greyfriars Church, Edinburgh, 1759; principal Univ. of Edinburgh, 1762; appointed historiographer of Scotland, 1764; author of a "History of Scotland during the Reigns of Mary and James VI," "History of the Reign of the Emperor Charles V," a "History of America," and an "Historical Disquisition Concerning the Knowledge which the Ancients had of India."

Robespierre (rō-bĕs-pĕ-ār'), **Maximilien Marie Isidore,** 1758–94; French revolutionist; b. Arras; admitted to bar, 1781; sent as a delegate of the "third estate" to the States-General, 1789; by his earnestness exerted a powerful influence in the Assembly and the Jacobin Club; public prosecutor, 1791–92; 1792, petitioned the Assembly for a revolutionary tribunal and a new national convention, and for his success was elected the first deputy to the new convention. The Jacobins were bitterly attacked by the Girondists, but Robespierre and Danton drew together and gained the ascendancy, and after the execution of the king, 1793, the triumph of the Jacobins became complete. The Committee of Public Safety then took absolute control of affairs, and Robespierre, having become a member, strengthened his own position by pitting the radicals and conservatives against each other. The intrigues of March and April, 1794, sent Danton, Desmoulins, and their followers to the scaffold, on a suspicion of favoring a reactionary policy, and Robespierre was left in supreme power, and assumed absolute control of the revolutionary tribunal. The executions from this time averaged about thirty a day. He set all Paris laughing by setting up a new religion, and presiding at its mummeries. The friends of Danton organized a conspiracy against "the tyrant," and his enemies in the Assembly assailed him with the most violent epithets. He broke away from the convention to appeal to the mob, whereupon the convention declared him an outlaw. In the *mêlée* that ensued his jaw was broken by the shot of a gendarme, and the following day, July 28, 1794, Robespierre, with twenty others, was carted to the guillotine amid the jeers of the populace.

Robin (rō-băn'), **Charles Philippe,** 1821–85; French biologist and pathologist; b. Jasseron, Ain; made Associate Prof. of Natural Sciences in the medical faculty at Paris, 1847; appointed to Chair of Histology, 1862; edited Nysten's "Encyclopædic Dictionary of Medicine"; established 1864 the *Journal de l'anatomie et de la physiologie normales,* which he edited until 1885. The progress made in France in histology is entirely due to his teaching. Numerous works include "Treatise on Microscope," "Cellular Anatomy and Physiology."

Rob'in (shortened from ROBIN-REDBREAST), name applied in Great Britain to several singing birds of the family *Erythacinæ,* and improperly given in the U. S. to a species of thrush, the *Turdus migratorius.* There are fifteen genera of robins in Europe, W. Asia, and

ROBIN-REDBREAST.

N. Africa, most of them widely spread, resembling each other in their chief characteristic—the short tapering bill, curved at the extremity and partly covered with bristles. The best-known species is *Erythacus rubecula,* the robin-redbreast whose song is familiar to every British country household.

Robin Good'fellow, famous personage in English folklore; reputed son of Oberon, king of the fairies, by a mortal mother; noted for roguish tricks, fondness for disturbing the peace of families, and power of assuming various shapes. Shakespeare identifies him with the Puck or Hobgoblin, a domestic sprite who answers to the Knecht Ruprecht of Germany and the brownie of Scotch superstition. He is the "lubber fiend" of Milton's "L'Allegro."

Robin Hood. See HOOD, ROBIN.

Rob'ins, Benjamin, 1707–51; English mathematician; b. Bath; invented the ballistic pendulum; made experiments on the resisting force of the air to projectiles, and studied fortification in Flanders; became engineer in chief to the East India Company, 1749; fortified Madras, where he died of fever; author of "New Principles of Gunnery."

Rob'inson, John, 1575–1625; English clergyman; b. probably in Lincoln; obtained a bene-

fice near Great Yarmouth; suspended for nonconformity, 1602; gathered an independent congregation at Norwich; formally separated from Church of England, 1604; became pastor of a dissenting congregation (1604) gathered at Scrooby; suffered persecution which led many of his congregation to emigrate with him to Amsterdam, Holland, 1608; removed to Leyden, 1609; gathered there a numerous church; became a member of the university; held a public discussion with the Dutch professor, Episcopius, successor of Arminius, on the Calvinistic doctrine of predestination, 1613; entered into plans for colonization in New England abt. 1617; dismissed a portion of his congregation with a memorable sermon on their embarkment for America, July 22, 1620, intending to follow them the next year, but before negotiations were completed he died at Leyden. In 1891 a bronze tablet to his memory, placed on an outer wall of St. Peter's, Leyden, was dedicated by representatives of the National Council of the Congregational Churches of the U. S.

Robinson Cru'soe. See DEFOE, DANIEL; SELKIRK, ALEXANDER.

Rob Roy, abt. 1660–1734; popular name of a Scotch outlaw (Roy or ruidh meaning "red" in Gaelic), whose true name was Robert MacGregor; changed his name to Campbell on the outlawry of the clan MacGregor, 1693; became a partisan of the Pretender, 1715, and for many years thereafter continued to make depredations, chiefly on the retainers of the Duke of Montrose. His exploits formed the basis of a novel by Sir Walter Scott.

Robusti (rō-bōs'tē), **Jacopo** (called TINTORETTO), abt. 1515–94; Italian painter; b. Venice; son of a dyer (tintore); is said to have been a pupil of Titian for a short time; lived poor and unknown for several years; did most of his work in his native city; abt. 1546 undertook two very large pictures in Santa Maria dell' Orto—"The Last Judgment" and "Moses on Mount Sinai," or "The Golden Calf," as it is sometimes called; from that time was steadily occupied, and generally on large and important pictures. His works in Venice include a "Last Judgment" and a "Paradise," in the Ducal Palace; "Crucifixion," in the Senola di San Rocco; "Marriage of Cana," in Church of Madonna del Salute; "Miracle of St. Mark" and "Virgin with Child," Academy of Fine Arts. Pictures of his are in the British Museum, Old Pinakothek at Munich, Louvre, and National Gallery of London.

Rocafuerte (rō-kä-fō-ăr'tā), **Vicente,** 1783–1847; Ecuadorian statesman; b. Guayaquil; elected deputy to the Spanish Cortes, 1812; after Ecuador became part of Colombia, held diplomatic posts in N. America and Europe, and resided several years in Mexico; returning 1833, was elected to Congress, but his liberal opinions caused him to be exiled. The same year the Liberals revolted and proclaimed him supreme chief, but he was defeated and captured by Flores. The latter offered to coöperate with him in the reorganization of the republic, and under this arrangement Rocafuerte was President, 1835–39; later held various civil and diplomatic posts; published many works on political subjects.

Rochambeau (rō-shäṅ-bō'), **Donatien Marie Joseph de Vimeure** (Vicomte de), 1750–1813; French general; b. near Vendôme; son of Comte de Rochambeau; became general, 1792; fought against the negroes in Santo Domingo; defeated the allied English and French royalists in Martinique, 1793, but the former being reinforced, he was obliged to surrender, March 22, 1794. In 1796 he became Governor General of Santo Domingo, but a local conflict resulted in his being carried as a prisoner to France. Returning with Leclerc, he aided in defeating Toussaint l'Ouverture, and on Leclerc's death (November 2, 1802) succeeded him as governor; but was overpowered, and on his journey home was captured by the English, and detained till 1811; killed at Leipzig.

Rochambeau, Jean Baptiste Donatien de Vimeure (Comte de), 1725–1807; French military officer; b. Vendôme; entered the army, 1742; distinguished in the Seven Years' War; lieutenant general, March 1, 1780; commanded French forces in the U. S. in Revolutionary War, 1780–82; Governor of Picardy, 1783; Marshal of France, 1791; commanded Army of the North, 1792; imprisoned during Reign of Terror; escaped the guillotine only through death of Robespierre.

Roch'dale, town of Lancashire, England; on the Roch; 11 m. N. by E. of Manchester; has large manufactures of woolen goods, such as baize, flannels, blankets, and kerseys, cotton goods, especially calicoes, and iron and steel ware; distinguished as having made the first successful attempt at coöperation; parish church dates from twelfth century; pop. of municipal borough (1906) est. 87,189.

Rochefort (rōsh-fōr'), **Victor Henri,** Marquis de Rochefort-Lucay, 1830–1913; French journalist; b. Paris; became one of the editors of *Figaro,* and was removed because of his satires on the imperial government. In June, 1868, he founded *La Lanterne,* in which he so bitterly attacked the empire that the journal was suppressed and its editor condemned to a year's imprisonment and a fine of 10,000 francs. He fled to Belgium, and there resumed the publication of *La Lanterne.* In 1869 he was elected to the Corps Legislatif; same year founded a radical journal, *La Marseillaise*; 1870 was sentenced to six months' imprisonment and fined for violent language. On the fall of the empire, 1870, he became a member of the government of national defense. In 1871 he founded *La Mot d'Ordre,* and was elected to the National Assembly. On the entrance of the national troops into Paris he fled, but was arrested, tried for complicity in the acts of the Commune, and sent to the penal settlement of New Caledonia, whence he escaped 1874, and returned to Europe. The amnesty of July 11, 1880, allowed him to return to Paris, where he founded a new radical paper, *L'Intransigeant.* He was elected to the Chamber, 1885, but soon resigned. He was an ardent champion of Boulangism, 1888, and was

condemned by the high court of justice, 1889, but fled to London. Profiting by an amnesty, 1895, he returned to Paris; author of a number of farces, vaudevilles, comic romances, etc.

Rochefoucauld (rŏsh-fō-kō'). See LA ROCHEFOUCAULD.

Rouchefoucauld-Liancourt (-lē-äṅ-kōr'), **Duc de la.** See LA ROCHEFOUCAULD-LIANCOURT.

Rochelle', La. See LA ROCHELLE.

Rochelle Salt (named from La Rochelle, France, where it was first prepared, 1672), double tartrate of sodium and potassium; an efficient cathartic, considered more palatable than most preparations of the kind; chiefly used in preparing seidlitz powders.

Roch'ester, John Wilmot (Earl of), 1648–80; English poet; b. Ditchley, Oxford; succeeded to title, 1659; became a favorite at court of Charles II; wrote poems in accordance with prevailing taste; famous for wit and infamous for vices. His death-bed repentance was described by Bishop Burnet in a pamphlet which had an extraordinary sale. His "Poems and Familiar Letters" were published posthumously.

Rochester, city of Kent, England; on the Medway; 29 m. ESE. of London; continuous with Chatham, and connected with Strood by an iron swing bridge; has no manufactures of consequence, but considerable trade. Near the bridge are remains of a massive Norman castle, founded 1126, which with surrounding grounds have been converted into a public garden. The city is probably best known because of its grand cathedral. A bishopric was founded here abt. 604; the foundations of a cathedral then built have been laid bare; another cathedral, built abt. 1100, has been rebuilt and restored several times, and is noted for its W. front, Norman crypt, and choir doorway. Pop. (1901) 30,590.

Rochester, capital of Monroe Co., N. Y.; 229 m. W. of Albany; on the Genesee River, 7 m. from, 263 ft. above, Lake Ontario. Within city limits are falls of 96 ft., 26 ft., and 83 ft. respectively, below the last of which the stream becomes navigable for lake vessels. From the upper fall, near the center of the city, N. nearly to the lake, the river banks are of precipitous rock. On the banks, both to the N. and S., beautiful parks, embracing 650 acres, have been laid out, and on the lake shore are numerous summer resorts. The Erie Canal crosses the river by a fine stone aqueduct, 848 ft. long. The city is laid out in broad streets, abounding in fine shade trees. The public buildings include the courthouse, city hall, U. S. Govt. building, Masonic Temple, Chamber of Commerce, state arsenal, National and Lyceum theaters, Genesee Valley Club House, E. and W. School buildings. Educational institutions include Univ. of Rochester (Baptist), Baptist Theological Seminary, Wagner College (Lutheran), St. Bernard's Seminary (Roman Catholic), W. New York Institute for Deaf-mutes, and Mechanics' Institute. There is a vigorous Historical Society and an Academy of Science. Public institutions include the City, St. Mary's, Homeopathic, and Hahnemannian hospitals, and Monroe County Penitentiary, S. of the city. Owing to the surpassing fertility of the Genesee valley and its fine water power, flour was formerly the chief product of Rochester. There are still many flouring mills in operation, but the nursery business is of far more importance, and in this line Rochester outranks every other city. The largest carriage factory in the U. S., largest button factory, and largest manufactory of optical instruments are here. The kodak camera business originated here, and many millions are invested in it. Several large establishments are engaged in the manufacture of perfumery. In the manufacture of clothing, shoes, tobacco, and beer Rochester has a leading place. Other manufactures include telephones, pneumatic signals, machine-shop products, furniture, photographic supplies; factory-system plants (1909), 1,203; capital invested, $95,708,000; value of products, $112,676,000. The port of Rochester is Charlotte, on Lake Ontario. The assessed value of property, 1912, was $165,986,775; bonded debt, $11,341,000. The first house on the site of the present city was built 1812; the place was incorporated as village of Rochesterville, 1817, and as city of Rochester, 1834. Pop. (1910) 218,149.

Rochet (rō-shā'), **Louis,** 1813–78; French sculptor; b. Paris; began to exhibit 1835, his first statue being a "Boy Extracting a Thorn from his Foot." Among his most prominent works are the "Statue of Marshal Drouet," at Versailles Museum; "William the Conqueror," a statue at Falaise, Normandy; "Napoleon as a Scholar at Brienne"; a colossal equestrian statue of Pedro I, at Rio de Janeiro; and a similar statue of Charlemagne.

Rock, a natural mass of solid mineral matter. Popularly a rock is characterized as hard and unyielding, and is placed in antithesis to sand, clay, or mud. Modern geological usage extends the term so as to embrace any natural mass of solid mineral matter, whether compact or incoherent. Thus granite, limestone, sandstone, chalk, and deposits of sand, clay, and soil are all rocks. A third usage defines a rock as any natural mass of solid mineral matter that possesses nearly uniform structure, texture, and composition. Thus masses which may have like composition but different structure and texture are different rocks, *viz.*, granite, gneiss, porphyry, etc.; and rocks with similar textures but with different compositions are different rocks, as granite, diorite, gabbro. A fourth usage springs from the idea of the individuality of a rock mass as a geological body which has been brought into place by one act, as a continuous lava stream, or which is the result of the continued action of any set of forces upon a given kind of material, as a continuous bed of sand and gravel. One rock body may consist of several kinds of rocks, as a stratum whose basal portion is conglomerate and upper portion sandstone; a lava stream which is partly rhyolite, obsidian, and pumice.

Conclusions regarding the formation of rocks are partly a matter of observation, partly a

matter of inference. 1. Lavas flow out from craters and crevices in the earth in a liquid condition and, upon cooling, solidify into rocks. Similar material is thrown into the air in dustlike particles and larger fragments, and accumulates upon the surface in more or less compacted masses, as tuffs, breccias, etc.; or the lavas may remain within fissures and openings in the earth's crust. Similarity in composition and analogies in texture and in mineralogical characteristics between surface lavas and rock bodies below the surface, as well as their disposition toward surrounding rocks, permit logical inferences to be drawn regarding the original nature of rocks as molten lavas or magmas. All such rocks are *igneous* or *eruptive*. 2. Sand, silt, and soil are washed down slopes by water, or as sand and dust are blown by winds to be deposited when the force of the current lessens. They accumulate in layers or beds, horizontal or inclined, and by drying or cementation may become coherent masses. Mineral springs deposit layers of calcium carbonate, silica, etc., sometimes to great thickness. All such deposits are known as *sedimentary* rocks.

Changes that cause the rock to disintegrate are weathering or decomposition. Changes that convert it into a mass still possessing great durability are classed as metamorphism. Such metamorphism may be occasioned by heat, by solutions, or by dynamic forces, and the results may be recrystallization, the production of new minerals, fracturing, and rearrangement of the fragments. All rocks resulting from the metamorphism of igneous or sedimentary rocks, and those resembling them whose original nature may not be determinable, are called *metamorphic* rocks. The study and classification of rocks is called lithology. See BOWLDERS; GEOLOGY.

Rock, or **Rockfish.** See BASS.

Rock Crys'tal. See QUARTZ.

Rock'et, projectile known from remote antiquity in China and India, but first introduced into Europe abt. 900 A.D. Its distinguishing characteristic is that it is set in motion by a force within itself. Rockets were employed at first chiefly in fireworks for amusement; were then used in war for igniting an enemy's citadel; and were also used for signals. About the beginning of the nineteenth century Sir William Congreve gave them greater precision, and prepared them for extended military employment as weapons of offense.

Rock'ford, capital of Winnebago Co., Ill.; on Rock River; 92 m. W. of Chicago; seat of Rockford College for Women (nonsectarian); principal industries, manufacture of furniture, foundry and machine-shop products, woolens, hosiery, agricultural implements, paper, watches, etc. Settled 1836; incorporated as a city, 1852. Pop. (1910) 45,401.

Rockhamp'ton, town in Livingstone Co., Queensland, Australia; second in size in the state; 320 m. NW. of Brisbane; head of navigation on the Fitzroy; 45 m. from its mouth; chief center for the wool industry in the state. Large vessels discharge and load at Port Alma, at mouth of the Fitzroy, but small craft ascend to the town. Important gold mines are worked in the vicinity. Pop. (1901) 19,691.

Rock'ingham, Charles Watson Wentworth (Marquis of), 1730–82; British statesman; became Earl of Malton in peerage of Ireland, and marquis, 1750; premier, 1765–66; acquired popularity in the American colonies on account of the repeal of the Stamp Act; again premier, 1782.

Rock Is'land, capital of Rock Island Co., Ill.; on the Mississippi; 91 m. NW. of Peoria; derives its name from island in the river, belonging to the U. S. Govt., and site of its central arsenal and armory. The river on the E. side was dammed by the U. S. Govt., giving the city, island, Milan, and Moline great water power for manufacturing. A combined railway and highway bridge connects the island with the city and Davenport, Iowa, and another bridge connects the island with Moline. Industrial establishments include flour and lumber mills; sash, door, and blind factories; glass, stove, and agricultural-implement works; carriage and wagon factories. Rock Island contains Augustana College and Theological Seminary (Lutheran). The island was the site of a series of blockhouses, known as Fort Armstrong, prior to and during the Black Hawk War of 1832. Pop. (census of 1910) 24,335.

Rock Salt. See SALT.

Rock Weeds. See FUCOIDS.

Roc'ky Moun'tain Goat (so called on account of its goatlike appearance) species of antelope (*Mazama montana*) with short legs, round, black, decurved horns, long, white, woolly hair, and a short beard on the chin; very much larger than the domestic goat; found from N. Idaho S. into Colorado, in the higher parts of the Cascade and Sawtooth Mountains; extends N. for some distance into the Kootenai district of British Columbia, and thence ranges in some places down to the coast.

Rocky Mountains, all the mountains of N. America between the Great Plains and the Pacific; originally called STONY MOUNTAINS. To some extent, both by geographers and popular writers, the name Rocky Mountains is restricted to parts only of the W. mountain system. On the mountains and plateaus of the greater part of the region naked rocks are seen to an extent rarely known elsewhere on the globe. Chief among the causes of this are extreme aridity and great elevation, the lack of moisture preventing the growth of vegetation, and great elevation promoting rapid denudation of the rock material disintegrated at the surface. The mountain streams run at the feet of towering cliffs in deep gorges beset with rocks. In very late geological time the whole region has been the scene of much volcanic activity. This great mountain system extends through the U. S. from its S. border, through British America and Alaska to the Arctic, or from the 30th to the 70th parallel N. lat. Between the 38th and 42d degrees of N. lat. the system

has a breadth of about 1,000 m. Its highest peak is Mt. Logan, in Alaska, 19,500 ft. In the same system are included the mountains of Mexico and Central America, though the term Rocky Mountains has rarely been applied to them. The general plateau or upland on which the ranges stand in Mexico extends across the U. S. from N. to S., widening W. nearly to the Pacific. Its maximum elevation is in Colorado, where it reaches an extreme altitude of 10,000 ft. It descends also W. into the basin of the Colorado River, but rises again in Nevada, where it reaches an altitude of about 6,000 ft., descending thence W. to the foot of the Sierra Nevada in California. On the E. it descends to the low country traversed by the Mississippi in a long, undulating, treeless slope, known as the Great Plains.

The Desert ranges occupy S. Oregon and Idaho, W. Utah, all of Nevada, SE. California, S. Arizona, and SW. New Mexico, extending S. into old Mexico. This region is limited on the E. by the plateau region drained by the Colorado and on the W. by the Sierra Nevada and Cascade Range. The N. and greater part is known as the Great Basin, since it has no outlet to the ocean. It is in fact a group of many large and small basins, including that of Great Salt Lake. The highest summit of the Desert Range System is Mt. Delano, in the Tushar Range, 12,240 ft. Mt. Belknap, same range, is 12,200 ft. The Park System extends from S. Wyoming through central Colorado into New Mexico; bounded on the N. by the Laramie Plains, on the E. by the Great Plains, and on the W. by the plateaus; the S. limits cannot yet be defined. These mountains are drained by the Platte and Arkansas, which flow into the Mississippi; by the Rio Grande del Norte, which flows into the Gulf of Mexico; and by the Colorado of the W., which flows into the Gulf of California. The system is composed of ranges and irregular groups which stand as walls about the great parks (elevated valleys). Besides the larger parks there are many of smaller extent, of great beauty in midsummer but mantled with snow during many months of the year. In the Front Range are Gray's Peak (14,341 ft.), Torrey Peak (14,336 ft.), Pike's Peak, Pike's Peak Group (14,147 ft.), Mt. Harvard and Holy Cross Mt., Sawatch Range (14,375 and 14,176 ft. respectively), Blanca Peak, Sangre de Cristo Range (14,464 ft.).

The great plateaus stretch from S. Wyoming through W. Colorado and E. Utah far into New Mexico and Arizona; bounded on the N. by the Wind River and Sweetwater Mountains, on the E. by the Park Mountains, and on the S. and W. by the Desert Range region. The region is drained chiefly by the Colorado of the W.; on the SW. by the Sevier and a small portion on the SE. by the Rio Grande del Norte. The general elevation is about 7,000 ft., but the range in elevation is great. The Colorado plateaus, lying S. of the Grand Cañon of the Colorado, have a general elevation of 7,500 ft.; the Markagunt plateau, W. of the Sevier, Utah, has a general elevation of 8,500 ft., to mention no others. On these plateaus stand lone mountains, buttes, and groups of mountains. The principal mountains of the plateaus include Emmons Peak, 13,694 ft., and Mt. Hodges and Tokwana, each 13,500 ft., all in the Uintah Mountains.

The Sierra Nevada is one great range, stretching from the 35th parallel of N. lat. to about 41° 35′, where the range topographically terminates at Mt. Shasta (14,350 ft.), or perhaps S. of this, at Lassen Peak. These mountains are carved from a great plateau more than 400 m. in length and 100 m. in breadth. Near the E. side the streams head, the greater number running W. into the Pacific, the remainder running E. and rapidly descending into desert valleys, where they are lost in the sands. The principal peaks of this system include Mt. Whitney (14,898 ft.), Mt. Tyndall (14,386 ft.), and Mt. Kaweah (14,000 ft.).

The Coast System is composed of the low, narrow ranges near the Pacific, and separated from the Sierra Nevada by the valleys of the Sacramento and San Joaquin which, after uniting, burst through the ranges, dividing them into two subsystems, the N. and S. coast ranges. To the N., beyond the head waters of the Sacramento, the coast ranges topographically coalesce with the Cascade Mountains, and to the S., beyond the head waters of the San Joaquin, with the Sierra Nevada. Its principal peak is San Carlos, 4,977 ft. The Cascade Mountains stretch from S. Oregon N. far into British America. On the E. they are bounded by the great valley of the Columbia River, whose cascades give the mountains their name, and on the W. by the Pacific. They consist of an irregular volcanic plateau, on which stand many volcanic peaks. Here belong Mt. Logan (19,500 ft.), Mt. St. Elias (18,101 ft.), Mt. Rainier (14,444 ft.), Mt. Adams (13,258 ft.), Mt. Hood (11,225 ft.). What may be termed the Geyser ranges include the Bighorn Range, the Wind River Range, the Front Range—which faces the plains, bears the continental divide, and separates the waters of the Missouri from those of the Columbia—and the Bitter Root Range, which forms most of the W. boundary of Montana. The Geyser System contains such lofty heights as Frémont Peak (13,790 ft.) and Mt. Hayden (13,691 ft.), in Wyoming, and Crazy Peak (11,178 ft.) in Montana.

In Canada the Rocky Mountain System is much narrower than in the U. S., and the platform on which the ranges stand is much lower. From the boundary as far N. as Peace River three members are distinguished: a front range, comparatively simple, known to Canadian geographers as the Rocky Mountains proper, and bearing the continental divide; a broken volcanic plateau; and, bordering the Pacific coast, a N. extension of the Cascade Range, also of volcanic origin and capped with enormous extinct volcanoes.

Still farther N. the Rocky Mountains continue their NW. trend, diminishing as they near the Arctic Circle, and finally disappearing between the Mackenzie and Yukon rivers. The Cascade Range continues through British Columbia and SE. Alaska, and rises in the

latter territory until it has many peaks exceeding 14,000 ft. in height, and culminates in the great mass of Mt. Logan. The valleys and gorges among these mountains are filled with numerous glaciers which extend very nearly to sea level. Thence W., following the coast line, this range diminishes, and finally drops into the sea, appearing above its surface in the chain of the Aleutian Islands. In the U. S. the Rocky Mountains, with the Great Plains that stretch E., constitute the great arid region where irrigation is necessary to agriculture. In N. California and W. Oregon and Washington the precipitation of moisture from the Pacific currents is very great, and hence this region is not embraced in the arid district. Less than ten per cent of the region is forest clad. Gold, silver, iron, copper, lead, salt, coal, and many other minerals are found in abundance, and the region is chiefly valuable for its mines.

Rocky Mountain Sheep. See BIGHORN.

Roco'co, a debased variety of the Louis Quatorze style of ornament, proceeding from it through the degeneracy of the Louis Quinze. It is generally a meaningless assemblage of

ROCOCO DOORWAY.

scrolls and crimped conventional shell work, wrought into all sorts of irregular and indescribable forms, without individuality and without expression.

Rodber'tus, Johann Karl, 1805–75; founder of German scientific socialism; b. Greifswald, Pomerania; held legal and political appointments under the Prussian Govt.; retired from public life on failure of movement for German national unity and devoted himself to economic studies. The chief principle of his economic creed is "that all commodities can only be considered economically as the product of labor, and cost nothing but labor." The aim of his work was to increase the share of the working classes in the national income, but this was to be attained by a gradual process of social evolution, and not by political agitation. For this reason, though an admirer and sincere friend of Lassalle, he resisted to the last the latter's appeal for coöperation in his efforts to organize a workingman's party of reform. Rodbertus proposed the establishment of a normal work day, in which the number of hours of labor and the quality of the work performed should be fixed by the government, and form a basis for a standard of income.

Roden'tia, order of mammals characterized by the chisel shape of the incisors, adapted for gnawing the hard vegetable substances on which they feed, such as the wood and bark of trees, hard-shelled nuts, etc. Rodents are generally small, numerous in species, prolific, and found in all parts of the globe. The order comprises such animals as the capybara, beaver, porcupine, squirrel, marmot, dormouse, rat, mouse, lemming, jerboa, hare, rabbit, muskrat, Guinea pig, agouti, and chinchilla. Rodents form nearly one third of all mammals, and in N. America one half of all the land mammals, about one fifth of all the described species being found there; of the squirrels, nearly one third of all known species are found within the limits of the U. S.; the pouched rats are entirely American; of the rat family, the field mice are best represented in N. America; of the porcupine family, more than seven eighths are S. American; while many species of hares are found in N. America, only one is met with in S. America. See MOUSE; RAT.

Rod'eric, d. 711; last Visigothic king of Spain; became king abt. 709, after driving Witiza from the throne. The sons of the latter invoked the assistance of the Arabs. Roderic's forces were vastly superior in number to those of the invaders under Tarik; but in the battle of Jerez de la Frontera, which is said to have lasted eight days, he was betrayed by the sons of Witiza, and perished on the field.

Rod'gers, Christopher Raymond Perry, 1819–92; American naval officer; b. Brooklyn, N. Y.; entered the navy, 1833; served in the Seminole War, and on the coast of Mexico during the war with that country; commanded the *Wabash* at battle of Port Royal, and Battery Sigel at reduction of Fort Pulaski; Admiral Dupont's fleet captain in attack on Fort Sumter, April 7, 1863; chief of bureau on yards and docks, 1871–74; superintendent Naval Academy, 1874–78.

Rodgers, John, 1771–1838; American naval officer; b. Harford Co., Md.; entered the navy 1798; became captain 1799; employed in the operations against Tripoli, 1803–5; succeeded Commodore Barron in command, 1805, and afterwards conducted successful negotiations with Tripoli and Tunis. In the spring of 1811 Commodore Rodgers, in his flag ship the *President*, pursued near New York City the English ship-of-war *Little Belt*, suspected of having impressed an American seaman, and after a short engagement boarded her, thus widening

the breach between the two countries. On June 21, 1812, he sailed from New York City in command of a squadron. In an action with the British frigate *Belvidera* he was wounded by the bursting of a gun. The cruise was extended for about seventy days, and seven British merchantmen were captured. He later captured the British packet *Swallow*, with a large amount of specie, and the schooner *Highflier*. In June, 1814, he was appointed to the new frigate *Guerrière*, and aided in the defence of Baltimore.

Rödiger (rē'dĭg-ĕr), **Emil**, 1801–74; German Orientalist; b. Sangerhausen, Thuringia; was Prof. of Oriental Languages at Halle, 1835–60, and later in Berlin, and wrote on the Syriac language, Himyaritic inscriptions, etc. After the death of Gesenius, Rödiger edited his Hebrew grammar, from the thirteenth to the twenty-first edition.

Rodin (rō-dăn'), **Auguste**, 1840– ; French sculptor and etcher of the realistic school; b. Paris; began as a marble worker; for a long time remained in subordinate positions, working under the direction of or in company with Antoine Louis Barye in Paris and the sculptors employed on the new bourse at Brussels; exhibited in the Salon for the first time, 1875; made chevalier, Legion of Honor, 1885; works include "The Brazen Age," cast in bronze by the government and set up in the gardens of the Luxembourg; "The Helmet Maker's Wife," "John the Baptist Preaching," Luxembourg Museum; "Burghers of Calais," "The Creation of Man," "The Thinker," statues of "Balzac" and "Bastien-Lepage," busts of "Victor Hugo," "Puvis de Chavannes," and "Henri Rochefort."

Rod'man, Thomas Jefferson, 1815–71; U. S. army officer and inventor; b. Salem, Ind.; graduated at West Point, and assigned to the ordnance, 1841. To him is due the honor of inventing the method of hollow casting and, from the results of his experiments on metal for cannon and cannon powder, the design and construction of the 15- and 20-in. cast-iron cannon, with their projectiles and suitable powder. The principles involved in giving to the gun its correct exterior form, the proper distribution of strains in the metal, and the regulation of the interior pressure by the progressive burning of the powder were developed by him largely through the use of his pressure gauge. The path he marked out was followed by other investigators, and resulted in the development of modern guns.

Rod'ney, Cæsar, 1728–84; American patriot; b. Dover, Del.; sheriff of Kent Co., 1755–58; member of legislature many years, and Speaker, 1769–73; delegate to Stamp Act Congress, 1765; chairman of Delaware popular convention, 1774; elected to Continental Congress, March, 1775; was soon afterwards elected brigadier general; signed the Declaration of Independence; served under Washington in the New Jersey campaign, 1776–77; appointed judge of Supreme Court, but refused the office; defended Delaware from British invasion, president of Delaware, 1778–82.

Rodney, Cæsar Augustus, 1772–1824; American jurist; b. Dover, Del.; nephew of preceding; member of Congress, 1803–7; U. S. Attorney-general, 1807–11; went to S. America, 1817, as member of a commission to report on the insurrection against Spain; member of Congress, 1821–22; U. S. Senator, 1822–23; in the latter year became first minister to the Argentine provinces.

Rodney, George Brydges Rodney (Lord), 1718–92; British admiral; b. Walton-upon-Thames, Surrey; entered navy in his twelfth year; Governor of Newfoundland, 1748; re-entered navy, 1752; rear admiral, 1759; 1762, captured Martinique, St. Lucia, and Grenada; vice admiral, 1762; baronet, 1764; master of Greenwich Hospital, 1765; commander in chief in Jamaica, 1771; admiral and commander in chief at Barbados, December, 1779, when he sailed from England with a fleet of 30 vessels; defeated a Spanish squadron off Cape St. Vincent, January 16, 1780, and broke through the French fleet near Martinique, April 17, 1780, for which achievement he received the thanks of Parliament and a pension of £2,000. In the war against Holland (1781) he captured Dutch Guiana; as commander in chief of the W. India squadron engaged the French fleet under Count de Grasse, April 9, and again April 12, 1782, capturing seven ships of the line and two frigates; thanked and pensioned by Parliament, and created Baron Rodney of Rodney Stoke, Somerset, 1782.

Rodriguez (rō-drēg'), island in Indian Ocean; extreme E. of the Mascarene group and of the African Islands; 365 m. ENE. of Mauritius, of which it is administratively a dependency; area, 42.5 sq. m.; is of volcanic origin, and consists of a mountain ridge running E. and W., with considerable plains N. and S.; highest point (Le Piton), 1,160 ft.; are only two passages, each leading to one of the two ports. It is relatively arid, with a maritime tropical climate, and is subject to hurricanes during the NW., or winter, monsoons. It is devoted to agriculture and fishing. The turtles which once formed an important article of export have disappeared. Rodriguez was not permanently inhabited until 1691, when it was occupied by a Protestant refugee. It is of strategic importance, and belongs to Great Britain. Pop. (1901) 3,162.

Roe, Edward Payson, 1838–88; American novelist; b. Moodna, Orange Co., N. Y.; became chaplain Second New York Volunteers, 1862; later hospital chaplain at Fort Monroe; at close of Civil War became pastor of a Presbyterian church at Highland Falls, N. Y.; removed to Cornwall, N. Y., 1874, and began cultivation of small fruits, publishing "Success with Small Fruits"; best-known novels, "Barriers Burned Away," "Opening of a Chestnut Burr," "A Knight of the Nineteenth Century," and "Miss Lou."

Roebling (rō'blĭng), **John Augustus**, 1806–69; American engineer; b. Mulhausen, Prussia; settled near Pittsburg, 1831; established the manufacture of wire ropes there and afterwards at Trenton, N. J., and introduced their

use for suspension bridges, his first work being the suspended aqueduct of the Pennsylvania canal across the Alleghany River, completed 1845. He afterwards constructed the Monongahela suspension bridge at Pittsburg, and some suspension aqueducts on the Delaware and Hudson canal. In 1855 he completed the Niagara suspension bridge, and, 1867, that at Cincinnati. His last design was for the East River bridge, connecting New York City and Brooklyn; published "Long and Short Span Bridges."

Roe'buck, small species of the deer family (*Cervidæ*), the *Capreolus capræa,* found in Europe; more nearly related in some respects to the small common deer (*Cariacus*) of the U. S. than to any other of the European forms; characterized, however, by the antlers being destitute of an interior basal snag, the first branch arising considerably above the burr, and the tail being rudimentary or wanting.

Roentgen (rĕnt'gĕn), **Wilhelm Conrad.** See RÖNTGEN.

Roga'tion Days (Latin, *rogare,* "to ask"), in the Roman Catholic ecclesiastical calendar, the three days immediately preceding Ascension Day, when public litanies or supplications are made for a blessing on the fruits of the earth.

Rog'er I, 1031–1101; Count of Sicily; undertook, with his brother Robert Guiscard, 1058, the conquest of Calabria, and afterwards that of Sicily; took Messina, 1060; defeated the Saracens at Enna with great slaughter, 1061; but it was not till 1072 that he came into possession of the island, by the conquest of Catania and Palermo. In 1085 he succeeded Robert as chief of the Normans in Italy; 1090, subdued Malta.

Roger II, abt. 1095–1154; first king of Sicily; son of preceding; succeeded his father under guardianship; on death, 1127, of his cousin William, Duke of Apulia and Calabria, he seized all his dominions; received from his brother-in-law, the antipope Anacletus, the title of King of Sicily, and was crowned at Palermo, 1130; then established Anacletus in Rome, driving out Innocent II. In 1137 he was defeated by Lothaire II, who had been called in by his revolted vassals, but recovered his ground on the emperor's departure. Innocent II falling into his power 1139, Roger compelled him to confirm his kingly title, in return recognizing him as pope. He took Naples from Duke Sergius, and Capua and Aversa from Prince Robert. In 1146 he ravaged Epirus and Dalmatia, captured Corfu, and pillaged Greece, and afterwards extended his sway over a large part of the Barbary coast. He introduced the sugar cane and the manufacture of silk into Sicily.

Roger of Wen'dover, d. 1237; early Latin chronicler of English history, of whom little more is known than that he was a monk in the abbey of St. Albans and died prior of Belvoir; was author of the part of "Historia Major" which is called "Flores Historiarum," goes from 1189 to 1235, and was continued by Matthew of Paris.

Rog'ers, John, abt. 1505–55; first of the Marian martyrs; b. Deritend, suburb of Birmingham, England; rector of Church of the Holy Trinity, London, 1532–34; chaplain to the Merchant Adventurers at Antwerp, 1534–48; embraced Protestant opinions; compiled, by the aid of the translations of Tyndale and Coverdale, a revised edition of the English Bible, which he published under the assumed name of THOMAS MATTHEW, probably at Antwerp (1537); returned to England, 1548; became canon of St. Paul's; preached a sermon in denunciation of Romanism after the accession of Mary, 1553; burned at the stake at Smithfield.

Rogers, John, 1829–1904; American sculptor; b. Salem, Mass.; became superintendent of a railway repair shop at Hannibal, Mo., 1856; amused himself at spare intervals with modeling in clay; acquired a thirst for art, which led him to make a tour in Europe, 1857, and to spend some time at Paris and at Rome. On return, learning of a mode of casting intricate figures, he modeled the groups of the "Checker-player" and the "Slave Auction," with which, 1859, he went to New York, where they attracted notice. He produced, 1861, his "Picket Guard," followed by a succession of small groups of war subjects, which soon gained popular favor. Among them were "Taking the Oath," "One More Shot," "The Wounded Scout," "Union Refugees," "The Camp Fire," "The Home Guard," "The Returned Volunteer." Among later works are "The Fugitive's Story," "The Favorite Scholar," a series illustrative of Irving's "Legends of Sleepy Hollow" and "Rip Van Winkle," equestrian statue of Gen. John F. Reynolds, and bronze group, "Ichabod Crane and the Headless Horseman."

Rogers, Randolph, 1825–92; American sculptor; b. Waterloo, N. Y.; engaged in mercantile pursuits at Ann Arbor, Mich., and New York City; became a sculptor in Rome; returned to New York City after a few years with the statues of "Nydia," "A Boy and Dog," and others, which procured him reputation; designed and modeled the bronze doors representing the life of Columbus, for the E. entrance to the Capitol at Washington; designs for the Washington Monument at Richmond, Va.; executed a statue of John Adams, in Mt. Auburn Cemetery; "The Angel of the Resurrection," for Col. Colt's monument at Hartford, Conn.; colossal monument, 50 ft. high, for the State of Rhode Island, erected at Providence, 1871, and one still larger for Michigan, erected at Detroit, 1873, surmounted respectively by statues representing America and Michigan. He designed, among other works, the colossal bronze statue of Lincoln unveiled at Philadelphia, 1871, and a "Genius of Connecticut," for the state capitol at Hartford.

Rogers, Samuel, 1763–1855; English poet; b. London; son of a London banker, whose countinghouse he entered in boyhood; published some poetical trifles in *The Gentleman's Magazine* about 1780, and issued a small volume of verse 1786, but attracted no attention until

the appearance of his best poem, "The Pleasures of Memory," 1792. Succeeding to his father's large estate 1793, he soon retired from active business, published another volume of verse, 1798, and, 1803, established himself in the house No. 22 St. James's Place, London, which he made for half a century a kind of headquarters of literary society. He was the intimate (and often the useful) friend of nearly all the noted literary men in Great Britain, and his wealth, liberality, and social qualities gave his productions wide vogue. He issued editions of his own works much prized for their illustrations, among them "The Voyage of Columbus," "Jacqueline," "Human Life," and "Italy."

Roget (rō-zhā'), **Peter Mark**, 1779–1869; English author; b. London; was for many years secretary of the Royal Society, and lecturer on physiology at the Royal Institution; best-known work is the "Thesaurus of English Words and Phrases."

Rohan (rō-äṅ'), **Louis René Edouard** (Prince de), 1734–1803; French cardinal; was recalled from the embassy at Vienna, 1774, for his scandalous luxury and political meddling; 1778 became a cardinal, and, 1779, Bishop of Strassburg; was imprisoned, 1785, for his part in the affair of the diamond necklace (see LAMOTTE-VALOIS), and released 1786, but dismissed from court utterly disgraced. In 1789, as deputy of the clergy of Hagenau to the States-General, he was accused of disloyalty and resigned. In consequence of the concordat he relinquished his bishopric 1801.

Rohlfs (rōlfs), **Gerhard**, 1831–96; German explorer; b. near Bremen; studied medicine; served with the French army in conquest of Kabylia, and in series of journeys begun 1861 traversed the Morocco portion of the Sahara from W. to E., and explored the whole course of the wady Draa. In 1864 he crossed the Atlas Mountains to the oasis of Tuat, and published the first authentic description and map of the country. In 1865–67 he traversed the continent, disguised as an Arab, from Tripoli to Lagos, by way of Moorzook in Fezzan, Bilma, Kuka, the chief city of Bornu, the river Benue, the Niger, and the Gomba country. Subsequently he joined the English expedition against Abyssinia, and, 1869, crossed the desert from Tripoli to Alexandria, visiting the oasis of Siwah, the ancient Ammonium. In 1873, with an Egyptian expedition of 100 camels and 90 men, he explored the Libyan desert W. of the chain of oases which skirt the valley of the Nile. In 1885 he was appointed German consul general for Zanzibar, but soon resigned and settled in Weimar. His works include "Journey Through Morocco," "Land and People of Africa," "Across Africa," "Journey from Tripoli to the Kufra Oasis," "My Mission to Abyssinia," "What News from Africa."

Rokitansky (rō-kē-tän'skē), **Karl** (Baron von), 1804–78; founder of school of pathological anatomy in Vienna; b. Königgrätz, Bohemia; Prof. of Pathological Anatomy in Univ. of Vienna, 1834–75; made president of Austrian Academy of Science, 1869. His "Handbuch der pathologischen Anatomie" (5 vols., 1842–46) is considered the foundation of the science of pathological anatomy.

Ro'land, name of one of the principal representatives of mediæval chivalry, but whether an entirely fictitious personage or one of Charlemagne's paladins and fell at Roncesvalles, 778, is doubtful. His life and exploits form the subject-matter of numerous ballads, epics, romances in prose, rhymed and unrhymed chronicles in French, Spanish, English, Italian, German, and Danish. See ROMANCES.

Roland de la Platière (rō-läṅ' dė lä plätyär'), **Jean Marie**, 1734–93; French revolutionist; b. Thizy; inspector of manufactures at Amiens and afterwards at Lyons; published several works on manufactures and rural economy. In 1791 he was sent by the workmen of Lyons as commissioner to the National Assembly, joined the Girondists, and on March 23, 1792, became Minister of the Interior under Dumouriez. Louis XVI dismissed him for reading to him in open council a letter of remonstrance written by Mme. Roland, warning the king that his tenure of the throne depended on his compliance with the popular will. The Assembly ordered the letter to be distributed throughout France, and it raised a commotion which culminated in the insurrection of June 20th, paving the way for that of August 10th, when Roland and the other Girondists were restored to the ministry. His fellow minister, Danton, excited the Jacobins and the populace against him, and he was accused of abstracting some of the important documents which he had found in a secret closet of the palace during the trial of the king. On January 22, 1793, he resigned, and on May 31st was arrested, but escaped. He concealed himself in Rouen, and committed suicide on hearing of the execution of his wife.

Rolf. See ROLLO.

Rol'lers, birds of the family *Coraciidæ*, many species of which have the habit of rolling over in the air like tumbler pigeons. The rollers are birds of moderate size with stout beaks, wide gape, weak legs, and short toes. Most are of brilliant plumage, in which blue, green, reddish-brown, and dark red predominate, and thousands are used in the millinery business. They feed largely upon insects. The rollers are restricted to the Old World; Asia and Africa are their headquarters, a number are found in Malaysia, a few in Australia, and one species ranges into Europe.

Rollin (rō-läṅ'), **Charles**, 1661–1741; French historian; b. Paris; studied theology, but did not take orders; appointed professor in Collège de France, 1688; rector there, 1694; and coadjutor at Collège de Beauvais, 1696. He lost his position 1712 because he was believed to hold Jansenist opinions, but was reinstated 1720. His best-known work is "Histoire ancienne" (13 vols., 1730–38), which has often been reprinted both in French and in English; other works include "Histoire romaine" (9 vols., 1738–48), continued by Crevier, Lebeau, and Ameilhon, and "Traité des études."

Rollin, Ledru. See LEDRU-ROLLIN.

Roll'ing Mill, establishment for rolling metal into sheets, bars, rails, rods, or wire. It is an apparatus consisting of two or more cylindrical rolls, with smooth, rough, or grooved surfaces, to reduce an ingot or billet to a desired shape. With the exception of the Bessemer process, the introduction of the rolling mill by Henry Cort, 1783, was the most effective step in the production of cheap wrought iron and malleable steel. The first milling operation is that of roughing down the iron in the roughing mill (a pair of rolls with roughened surfaces); the second reduces the slabs thus formed to muck bars, between smooth-surfaced rolls, and these bars are then rolled into forms by a third set of rolls. In making heavy armor-plate rolls 3 ft. or more in diameter, the rolls turn at the rate of 50 revolutions per minute; thin plates and small rods are often rolled at speeds several times as great, in mills having rolls 8 or 10 in. in diameter. Mills for cold rolling are given exceptional strength, and reduce rods and bars very slightly, in the cold state, thus greatly increasing their strength and still more their elasticity. A slitting mill consists of a set of rolls with deep collars and grooves alternating, the upper collars fitting the grooves in the lower roll. Between these rolls sheets of thin metal are passed, and by them divided, by slitting, into a number of rods of rectangular section, the collars and grooves acting as shears.

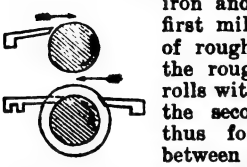


FIG. 1.—TWO-HIGH MILL.

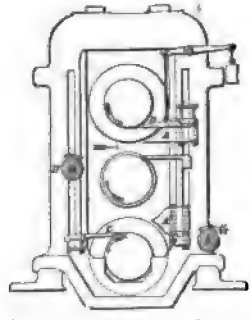


FIG. 2.—THREE-HIGH MILL.

Nearly all the members of machines, etc., for which iron and steel are suitable—ships, boilers, bridges, railways and work—are so designed that they can be rolled or compounded of rolled forms, for this method of manufacture is essential to their uniformity and cheapness. In a simple two-high mill (Fig. 1), running constantly in one direction, the bar, after passing between the rolls, must be drawn back by hand over the top roll, and entered again for another compression; thus half the time and a considerable amount of heat are wasted, and unproductive labor is performed. The first remedy was to reverse the motion of the rolls after the bar had passed through, so that they would draw the bar back again, and in so doing compress it. The reversing is usually effected by gearing and clutches, and sometimes by reversing suddenly a double engine running without a fly wheel. In any case the reversing machinery is costly to construct, wastes power, and requires many repairs. In the three-high mill (Fig. 2) the bar is entered at the front of the train, between the middle and bottom rolls, and at the rear of the train between the middle and top rolls. The engine runs constantly in one direction, thus avoiding the shock and delay of reversing; and the additional labor, as compared with the reversing mill, is the lifting of the bar on the back of the train through the height of the middle roll. In light work, such as rails, which are in any case passed to and fro by the workmen on hooks or swinging levers, this additional labor is very small, while heavy work is raised by tables moved by steam power.

Rol'lo, conqueror of Normandy. According to the saga of Harold Haarfager he was a son of Ragnvald, jarl of More, and was called Ganger Rolf—that is, Walking Rolf—because he was so large and heavy that no horse could carry him. Harold Fairhair drove him into exile, and this led to his crossing the seas and founding Normandy. According to Dudo, of St. Quentin, who wrote the history of Normandy in the eleventh century, Rollo was the son of a Danish chief, and on account of trouble with the Danish king fled from his native country, fought for many years in France, and finally got possession of Normandy. The Icelandic version making him a Norwegian is that most generally accepted. In 912 Rollo made peace with Charles the Simple in St. Clair. He received for himself and his followers the country along the banks of the Seine, between the little Epte and Eure rivers. He and his men accepted the Christian religion, and Rollo was baptized at Rouen and took the name and title Duke Robert. He is thought to have been over eighty years of age at the time of his death in 930. William the Conqueror was his great-grandson.

Romagnosi (rō-măn-yō'sē), **Gian Domenico,** 1761–1835; Italian jurist; b. Salso Maggiore; was chief civil magistrate of Trent, and while under arrest by the Austrians, 1799, observed the deviation of the magnetic needle under the influence of a galvanic current. His discovery, published 1802, attracted little attention until the discoveries of Oersted, 1819–20. He was Prof. of Law at Parma, 1803–6; then called to Milan to assist in digesting a code of penal procedure; later a chair was created expressly for him in Milan. On the fall of the Bonapartist kingdom of Italy he had to endure poverty and imprisonment. Being set at liberty, he continued his labors under great privations, supporting himself by private lessons.

Roma'ic, name applied to the vernacular language of the modern Greeks.

Ro'man Architec'ture. See ARCHITECTURE.

Roman Cath'olic Church, that body of Christians under the rule of their pastors, and principally of the Roman pontiff. The Church is composed of clerical and lay members. The "clergy" include all who exercise spiritual authority. The various ranks of the clergy constitute the *hierarchy*. From the Catholic standpoint, Christ not only appointed the apostles to continue His mission, but also gave to

Peter certain special attributes, making him the rock on which the Church is built (Matt. xvi, 16–19), empowering him to confirm his brethren (Luke xxii, 32), and commanding him to feed both the sheep and the lambs of the flock (John xxi, 15–17), and the office of the apostles is perpetuated in the bishops, the primacy of Peter in the Roman pontiff. As the successor of Peter the pope has immediate jurisdiction over the entire Church and over each of its members. Nevertheless, each bishop in his own diocese is possessed of authority in virtue of which he governs the faithful committed to his charge and ordains priests and ministers.

A number of dioceses are united into a province under an archbishop or metropolitan, of whom the bishops are said to be *suffragans*. The title of primate is given to the bishop whose see was at one time an "apostolic vicariate," the vicar holding special powers from the Roman pontiff. Special jurisdiction over several provinces was granted by St. Peter to the patriarchs of Antioch and Alexandria. The pope is aided by the College of Cardinals. These are seventy in number, are created by the pope, and grouped, for the administration of ecclesiastical affairs, in twenty-one congregations. These, with various subordinate officials, form the Roman *curia*, the ordinary organ of papal government. Furthermore, when circumstances require it, the pope sends his nuncios and legates to different portions of the Church, and empowers them to represent his person.

The fundamental element in the Roman Catholic Church is the permanent existence of a living teaching authority (Matt. xxviii, 19, 20). Through the abiding assistance of the Paraclete (John xiv, 16, 17), this authority is infallible in matters of faith and morals. Its subject is twofold: The teaching Church, *i.e.*, the pastors in union with their head, the pope, and the pope himself speaking *ex cathedra*. The immediate sources of doctrine are the ordinary teach.ng of the Church, the definitions of the pope, or those of an ecumenical council. The documentary sources are the writings of the early apologists, the acts and epistles of the apostolic churches, the works of the Fathers, doctors, and theologians. Moreover, the articles of faith have at various times been summarized in creeds or symbols. Such are the Apostles' Creed; the Nicene, promulgated by the Council of Nice (325); the Athanasian, by St. Athanasius, Bishop of Alexandria (d. 373); and that published by the Council of Constantinople (381).

The sacraments are seven: Baptism, confirmation, holy eucharist, penance, extreme unction, orders, and matrimony. The eucharist is not only a sacrament, but also a sacrifice, and as such is offered in the mass. This is the principal act of worship in the Church and the center of her liturgy. The office, or public prayer of the Church, is a collection of psalms, extracts from both Testaments, commentaries of the Fathers, and short lives of the saints. It is divided to suit the different hours of the day, and is either chanted in common, as is the case in monastic orders and canonries, or is recited in private, its recitation being obligatory on all who have received the subdiaconate. Both in the mass and office there are certain portions which vary according to the liturgical season and the festival which is observed on a given day. Ecclesiastical feasts are days set apart for honoring in a special way some event in the life of Christ, of the Blessed Virgin Mary, or of the other saints. The greater of these feasts are preceded by seasons of a penitential character—such as Advent before Christmas, Lent before Easter, and the vigil of many other festivals. The chief practices enjoined for this preparation are fasting, abstinence, and prayer.

The language of the liturgy in the W. Church is Latin, while in the churches of the E. the vernacular, mostly in its archaic form, is employed. There exist also differences in the form of the liturgy itself, and consequently a variety of rites, such as the Coptic, the Arminian, and the Greek. Along with these general means of sanctification, the Church has encouraged the founding of associations whose members are bound by special vows, live under particular rules, and labor for some peculiar purpose, such as caring for the poor and sick, spreading the Gospel, and carrying on the work of education.

Ecclesiastical legislation is incorporated in the canon law. The penalties inflicted for violation of ecclesiastical law are of two sorts: the *pœnæ communes*—excommunication and interdict—which may be incurred by clerical and lay offenders, and the *pœnæ particulares*—suspension and deposition—to which clerics only are liable. Finally, as the members of the Church are at the same time subjects of the civil power, it has often been found necessary for Church and State to define their relations and settle upon a *modus vivendi*. These agreements regarding the external relations of the Church are termed concordats.

The world's Roman Catholic population, which includes all members of Roman Catholic families, and not merely communicants, as in Protestant bodies, was est., 1907, at 230,866,500; largest Roman Catholic countries in their order, France, Austria-Hungary, Italy, Germany, and Spain. The Church had 6 cardinal bishops, 50 cardinal priests, and 5 cardinal deacons, the Sacred College being 9 short of legal number. Besides the pope and cardinals, there were 8 patriarchates of the Latin and 6 of the Oriental rite, 184 archbishoprics of the Latin and 19 of the Oriental rite, and 738 bishoprics of the Latin and 52 of the Oriental rite. The U. S. has three cardinals, one apostolic delegate, 17 archbishops, 87 bishops, and an estimated Roman Catholic population of over 14,000,000.

Romance', or **Roman'ic Lan'guages**, those modern languages which, as the result of continuous oral transmission, are the current forms of spoken Latin. The languages grouped together under this name are French, Provençal, and Catalan (the last is hardly more than a dialect of Provençal), Spanish, Portuguese, Italian, Roumanian, and the Rhæto-Romance dialects. The territory is in general

that of the Roman Empire, excepting those parts which by later popular migrations or conquest were afterwards removed from the sway of the Latin language, and those regions which were never completely Romanized. The Latin spread in the conquered provinces was naturally the vulgar speech of soldiers and colonists, not the Latin of the classic writers. In its vocabulary it differed somewhat from the literary Latin, more or less vulgar words or meanings being used, as for "horse," *caballus*, a nag; for "fire," *focus*; for "to strike," *batuere*; for "to turn," *tornare*, etc.; and derivative words, especially diminutives, were used sometimes instead of the simple ones. Some words from foreign languages were added to the vocabulary. The oldest borrowings from Greek show Greek sounds to have been imitated as heard in Italy. Many of the words from Greek are church words, as the French *église* church (Italian, *chiesa*; Spanish, *iglesia*), *episcopos* (French, *évêque*; Old French, *evesque*; Italian, *vescovo*; Spanish, *obispo*). The word *tornare*, mentioned above, is from Greek.

Of importance and interest are the borrowings from Germanic dialects after Germanic peoples came over the border and established themselves on Roman or Romanized territory. These newcomers became finally absorbed in the Romanized population, and after a time their descendants used only the Romance speech; but many Germanic words (not all retained to the present day) became familiar, and in France at least the Germanic influence extended somewhat beyond additions to the vocabulary. Only the Roumanian shows few or no traces of early Germanic influence. The influence of Arabic came later, and was felt especially in the Spanish peninsula, where it began early in the eighth century, and in Sicily. The effect of the Iberian and of the Celtic languages seems to have been small. Even in the vocabulary Celtic influence was apparently considerably less than that of Germanic speech, and it is still doubtful whether Celtic habits of pronunciation had any traceable effects on Romance phonology. Slavic and other languages, as Greek, Turkish, Hungarian, Albanian, and perhaps others of which little or nothing is known, have affected Roumanian.

Romance of the Rose, famous French poem. Guillaume de Lorris composed the first portion (4,680 verses) abt. 1237, and, abt. 1277, Jean Clopinel, commonly called Jean de Meun, completed it in a total of 22,817 verses. The former wished to write an allegorical art of love, and so represented the whole as a dream, designating the object of the lover's pursuit as a rose which must be plucked, an idea taken from the earlier "Dit de la rose." Jean de Meun preserved the form and the allegorical characters of the story, but used them only as a pretext for bringing out his own erudition, speculations, and observations. The "Romance of the Rose" became at once the most popular poem in the French tongue. It was reproduced in Flemish and Italian in the thirteenth century, and in English by Chaucer—a version which has probably not come down to us, though the "Romaunt of the Rose" of about this time, printed in the editions of Chaucer's works, has found able defenders.

Romances (so called from the *lingua Romana*, or vernacular, in which they were mainly composed), expression of that desire for the adventurous, the new, foreign or marvelous, and the ideal which characterized the early vigor of European literature in the interval between the Dark Ages and the revival of learning. This definition leaves out of account the late Greek romances; it also excludes consideration of romances in Latin, like the "Ruodlieb," written by a Bavarian abt. 1050 and called the earliest romance of Europe. Along with its exaggerated adventures of chivalry, the romance struck the new note of sentimental love. Incident is the main consideration, but ideals of character, types rather than individuals, are developed in such figures as Launcelot and the courteous Gawain. The *Arthurian romances*, foundation of the whole edifice, have for their corner stone the "Historia Britonum" of Geoffrey of Monmouth, who died 1154. The work is based partly on Nennius, partly on Breton traditions; also perhaps on Geoffrey's invention. The daring imagination of this book met most happily a new spirit in European literature. The contact, moreover, was on Norman or French soil, and in these chivalrous surroundings the romances of Arthur and his Round Table—the latter was first noticed by Wace in his "Gestes des Bretons"—rapidly became an international possession. Conspicuous for novelty and merit were the romances of Chrestien de Troyes, who brought the adventurous material into unison with the new ideals of chivalry.

A successful German version, with strong ethical leanings, is the "Parzival" of Wolfram von Eschenbach. Meanwhile important facts and characters had been added to the Arthurian legend—Launcelot, with his love for the queen, the Cornish Tristan, and, above all, the story of the Grail, in the later romances merely a miraculous jewel, but commonly regarded as the cup or dish used by Christ at the Last Supper. Finally, all these characters and incidents were combined in a single narrative by Sir Thomas Malory.

Out of the materials of the popular epic, which had reached its height in the "Chanson de Roland," the age of chivalry built up for aristocratic patrons, and according to more refined ideals, a cycle of romances which centered in the person of Charlemagne. This cycle touches that of Arthur in many points, the Saracens of course taking the place of the Saxons. Later there sprang up in France a number of prose romances on the same subjects, such as the interesting "Huon de Bordeaux," best known in the charming "Oberon" of the German poet Wieland. Another cycle goes back to pseudo-classic sources, as in the romances about Alexander and those which belong to the "tale of Troy divine," for example, Benoît de Sainte-More's "Roman de Troie," 1185. The Spanish "Amadis de Gaula" owed much to the Arthurian cycle, and is chief of the numerous family to which Cer-

vantes paid his respects. It is impossible, however, to follow all the later and divergent paths of the romance, which lead not to distinct persons so much as to special subjects. Such are romances of the innocent wife, like Griseldis; romance with satiric leaning, as in "Reynard the Fox," which lays the beast epic under contribution; pastoral romances, like Sidney's beautiful "Arcadia," and long romances of later date, such as those of Mlle. de Scudéry. See FICTION; NOVELS.

Roman'ic Lan'guages. See ROMANCE, or ROMANIC LANGUAGES.

Ro'man Law, primarily, the body of rules which governed the city of Rome and its citizens. As the power of Rome grew, this system of law was extended over a large part of Italy, but it was not generally introduced into other territories nor made applicable to Rome's subjects as distinguished from her citizens. For the conquered provinces and their inhabitants a different body of rules was worked out. This new law was only in small part a further development of the law of the city; in the main it was a distinct and superior system. It was based on the customs of the various Mediterranean peoples, and representatives of nearly all those peoples ultimately played some part in its development. During the imperial period these two systems were gradually fused into one, and in the codification of Justinian they are presented as a single and substantially homogeneous body of law. Much of the Roman law has only an historical interest. This is the case with the older law of the city as a whole; this is the case also with the public law of the empire. On the other hand, the principles governing private relations, which were worked out in the later republic and the early empire and which were incorporated with little change in the law books of Justinian, have more than an historical significance—they are to-day a living force.

It was in large part on the basis of the Roman law that the mediæval Church worked out for all Christendom its law of family and of testament. Toward the close of the Middle Ages the law books of Justinian, as modified by the Roman canon law, became the chief basis of adjudication in the secular courts of continental Europe, and in the so-called "modern Roman law" Europe obtained a body of substantially uniform rules for property and obligations. The principles of the Roman law have not exercised a controlling influence on the English common law; but in all modern states, except those founded by Englishmen, the existing law is based on Roman conceptions of private right, reveals in its form the influence of Roman legal science, and expresses itself in Roman terms. The modern civil codes of Europe and of Central and S. America are Roman in much the same sense in which the existing law of the self-governing British colonies and of the U. S. is English; and in this sense the Roman law and the English law are the two great systems that rule the modern civilized world.

Roma'no, Giulio. See GIULIO ROMANO.

Roma'noff, name of the family from which the last dynasty of Russia derived its origin. Michael Feodorovich Romanoff, the descendant through his grandmother of the royal house of Ruric, was the first of the name to ascend the imperial throne, being chosen by the higher nobility and the clergy, 1613. His successors in the male line ruled till the death of Peter II, 1730, when the succession reverted to the female line. Another change took place on the death of Elizabeth, 1762, when her nephew, the son of the Duke of Holstein-Gottorp, ascended the throne under the title of Peter III, founding the dynasty of Romanoff-Oldenburg, to which the late sovereign of Russia belonged.

Ro'mans, Epis'tle of St. Paul to the, one of the most important of the Pauline books; probably written from Corinth. It affords so many fine examples of the noble and altogether peculiar style and reasoning of the great apostle that its authenticity has never been seriously called in question. Its contents are largely doctrinal, but it contains fine hortatory passages and directions for practical conduct. Its exegetical literature is extensive. The epistle contains a thorough and comprehensive statement of the theology of Paul. He wrote the epistle to the Church at Rome, which had been already established, probably by some of his own disciples, in order to prepare the way for a visit which he was anxious to make to them (xv, 23). At the time of writing he was under the necessity of going to Jerusalem (xv, 25–27). He therefore stood at the point described in Acts xx, 3; that is, about the year 58.

Roman'ticism, term applied to a literary and artistic school or movement which is opposed to the methods and ideals of classicism and realism. In the Middle Ages lay just the picturesque material for which the romantic spirit yearned; and as the classicists had scorned this period, the reactionists began with an attempt to revivify mediæval life.

In England the reaction even at the height of Augustan taste is foreshadowed by Parnell and Allan Ramsay. The dominance of the heroic couplet was overthrown by Thomson, Young, and others, who cultivated blank verse. The sonnet was revived; Spenser and Milton were restudied and imitated. Percy's "reliques" and similar collections aided the movement which culminated in the works of Scott. The northern mythology became known through Mallet's "History of Denmark," 1755. Gray, a disciple of Dryden, was converted to romanticism, and was also the first man of note in the eighteenth century to appreciate natural scenery. Walpole's "Castle of Otranto," 1764, and Miss Radcliffe's novels are examples of early romantic fiction. Coleridge and Keats are identified with romanticism, and Wordsworth's methods and theories give him place in the movement. After 1830 romanticism in Great Britain became less pronounced, because everything in a sense was romantic.

The romantic movement of 1830 in France was a bitter fight between a band of young reformers and the national literary instinct. The beginnings of French romanticism are found in Chateaubriand and Mme. de Staël,

but it was with Hugo that the school definitely began (and ended) its work. A group of young writers followed enthusiastically in Hugo's wake. Géricault (1791–1824) and Delacroix (1799–1863) led the romantic school in art.

In Germany the romantic movement flourished, drooped, and flourished again between 1770 and 1832. Herder's interest in the past kindled a flame of mediævalism, which was reënforced by Ossianic sentimentalism from Great Britain. Ossian influenced Goethe's "Werther," and "Götz von Berlichingen" (1773) came from the heart of Goethe's youthful romanticism. Twenty years later, however, owing to the interest in Greek antiquity, classicism became supreme. Early in the nineteenth century romanticism reasserted itself, and a younger generation of poets took up the old patriotic German literature. The Schlegel brothers, Tieck and Novalis, were the leaders of the romantic school proper; the younger, or new romantics, were represented by Uhland, Brentano, the Grimm brothers, Arnim, and others.

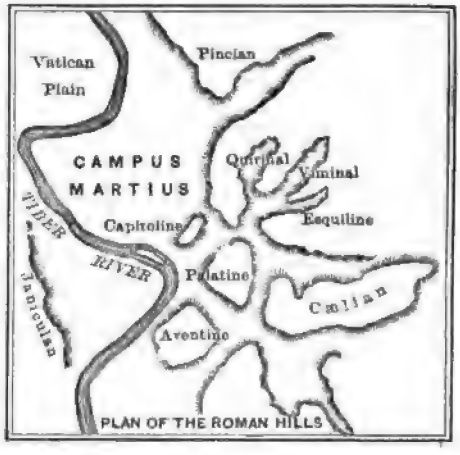
Rom'any Lan'guage, language of the GYPSIES (*q.v.*).

Rome, capital of Kingdom of Italy; on the Tiber, about 15 m. from its mouth, in an undulating plain; surrounded by walls about 14 m. in circuit, of which ten are on the left bank of the Tiber. These are surmounted by 300 towers and pierced by thirteen gates, besides two that have been walled up. Since 1870 Rome has been further surrounded by forts forming a circle about 30 miles in circumference.

Of the gates the most remarkable is the Porta del Popolo, through which passes the road which crosses the Tiber by the Ponte Molle, 1½ m. distant, and leads to N. and E. Italy. The Tiber traverses the city from N. to S. in three wide curves, and is spanned or partially spanned by twelve bridges. Among these are Ponte Sant' Angelo, the ancient Pons Ælius, built by Hadrian; Ponte Cestio, the ancient Pons Cestius, connecting the Trastevere with the island of the Tiber (Isola Tiberina di Bartolomeo); Ponte de' Quattro Capi, or Ponte Fabricio, the ancient Pons Fabricius, the oldest bridge of Rome existing, built 62 B.C. by L. Fabricius—it leads from the island of the Tiber to the left bank of the river.

The city is divided into two unequal parts by the river. The smaller and more modern part, on the right bank, consists of a N. and S. portion. The former contains the palace of the Vatican, the Church of St. Peter, and the castle of Sant' Angelo. The last structure (Moles Hadriani), commenced by Hadrian and finished 140 by Antoninus Pius, was intended for a mausoleum for Hadrian and his family. During the feuds of the early Middle Ages it formed a stronghold in the hands of the ruling faction.

The larger, E. part of the city, on the left bank of the Tiber, occupies the famous seven hills. Farther to the N., near the Porta del Popolo, rises Monte Pincio (Collis Hortorum), 175 ft. above the level of the sea. Separated from Monte Pincio by the Piazza Barberini extend the Esquiline hill, the Quirinal, and the Viminal. Farther to the S. rises the Cælian, and between this and the river the Aventine. In the S. part of the plain, between this range of hills and the Tiber, rise, isolated, two other hills—the Palatine and the Capitoline. The latter formed the most prominent point of ancient republican and imperial Rome. On the Capitoline hill are the Church of Sta. Maria in Araceli, which was erected before the tenth century on the site of the temple of Juno Moneta; the Piazza del Campidoglio, designed by Michelangelo; the Palazzo del Senatore,



erected by Boniface IX, which contains a hall for the meetings of the municipal council, offices, etc.; the Palazzo dei Conservatori, containing a collection of busts of celebrated Italians, and the new Capitoline Museum.

From the Capitoline, toward the Palatine, extends the ancient Forum Romanum. The Palatine contains the ruins of the ancient imperial palaces. Between the Palatine and the Aventine lay the Circus Maximus; to the SE. of the Aventine the baths of Caracalla. In the depression between the Palatine, Esquiline, and Cælian stands the Coliseum, not far from which are the Arch of Titus and the Arch of Constantine. Between the Cælian and the Esquiline stand San Giovanni in Laterano, the oldest church of Christendom, and the Museum Gregorianum Lateranense. Near the Lateran is the building containing the Scala Santa, a flight of twenty-eight marble steps brought from the palace of Pilate at Jerusalem by the Empress Helena, 326. Beyond the S. slope of the Esquiline are the Church of Saint Maria Maggiore, also called the Basilica Liberiana, erected by Pope Liberius, 352–366; the Palazzo Rospigliosi, containing many fine frescoes and pictures; the Palazzo Barberini, with a library containing 7,000 MSS. of Latin and Greek authors; the Villa Albani, built 1760, with admirable works of art, opposite the Baths of Diocletian, and the gate, Porta Pia, designed by Michelangelo, 1564, and restored by Pius IX, 1861–69.

The modern city, occupying the space between the river and the hills, is divided into two parts

by the Corso, which, running in a straight line for a distance of nearly 1 m. from the Piazza del Popolo to the Piazza di Venezia, is the finest and gayest street of the city. Among the many elegant buildings which line it on both sides are the Palazzo Doria, containing the Doria Gallery, and the Palazzo Colonna. The portion of the city between the river and the Corso contains many notable monuments, among which is the mausoleum of Augustus, an immense substructure containing the burial chambers, and covered with a terraced mound of earth. It was used in the Middle Ages as a fortress by the Colonnas, and is fitted up as a theater. Here is the Palazzo Borghese, built 1590; the Church of Sta. Maria Rotonda, or the Pantheon, the only ancient edifice in Rome which has been preserved entire. Near the Pantheon is the Church of Santa Maria sopra Minerva, erected abt. 1285 on the ruins of a temple of Minerva. Here is also the Palazzo Farnese, now the home of the French embassy to the papal court. Here, too, are the Palazzo di Venezia (now the Austrian embassy), near which are the Forum and Column of Trajan and the Palazzo Massimi alle Colonne. The famous catacombs, in total length not less than 600 m., lie mostly within a circuit of about 3 m. from the modern walls.

Among the public libraries are the Biblioteca Alessandrina, the Biblioteca Angelica, the Biblioteca Casanatensis, and the Biblioteca Centrale Vittorio Emanuele in the Collegio Romano, containing 500,000 volumes. In the Collegio Romano there is also the Museo Kircheriano with a collection of antiquities. Besides the new Capitoline Museum for the results of the new excavations, there are also the museums in the Baths of Diocletian and at the old villa of Pope Julius III. The Villa Medici contains a large collection of casts from ancient statues. The university (Universita della Sapienza) was founded by Boniface VIII, 1303. The manufactures and industries are of little importance. Woolens, silks, velvets, leather, hats, gloves, and neckties are made, but the principal manufactures are of mosaics, bronzes, casts of statuary, and other articles connected with the fine arts. The city is fairly healthful. The rainfall is slight. In the winter the mean temperature is about 46° F., and in July and August, 75° F. In the latter month and September malaria is prevalent, but there are several parts of the city in which it is not found. The water supply is exceptionally good, and few towns are better supplied with public fountains. The area within the walls is 3,880 acres. The pop. of Rome has increased rapidly since it became the capital of Italy; 1870, it was 226,022; 1901, 462,743.

ROME FROM 753 B.C. TO 476 A.D.

According to the legends current during the later republic, the city was founded 753 B.C. by a settlement from Alba Longa, led by ROMULUS (*q.v.*). The earliest settlement on the Palatine Hill grew by the addition of numerous fugitives, and by union with the neighboring Sabines, whose king, Titus Tatius, was associated with Romulus in the government. Romulus was the founder of the political and military institutions of the Romans, as his successor, Numa Pompilius, was the organizer of their religious institutions. After the reigns of Tullus Hostilius, the conqueror and destroyer of Alba Longa, and the peace-loving Ancus Marcius, an Etruscan dynasty gained possession of Rome. Under the three kings of this house—Lucius Tarquinius, Servius Tullius, and Tarquinius Superbus—Rome grew rapidly in power, but the rule of the last Tarquin became so oppressive that the people drove him out and established a republic, 509.

However and whenever founded, the earliest Rome was a small Latin town on the Palatine and the small adjacent hills, whose position on the Tiber gave it important commercial advantages. The history of the Roman state begins with a community of three tribes—the Ramnes of the Palatine and their neighbors whom they had absorbed, the Sabine Tities on the Quirinal, and the Luceres on the Cælian. Each tribe was divided into ten curiæ, and these again into clans or gentes. The members of the gentes—the patricians—alone had political rights. The government consisted of a king, who was chief priest, judge, and commander in war; of a senate of 300 heads of families, and of a popular assembly (*comitia curiata*), composed of all patricians capable of bearing arms. There were three other social classes which in time united to form the class of plebeians—the clients or serfs of the clans, a number of resident foreigners engaged in trade, and the rural plebeians or inhabitants of conquered Latin cities who had not been admitted to citizenship. Under the kings the walls were built and important public works erected, and the Roman territory came to include the greater part of Latium. Important constitutional changes were made, and as a means of strengthening the army, hitherto composed only of patricians, the people were grouped into five classes on the basis of landed property. This organization soon acquired political importance, and the 193 military divisions or centuries into which the classes were divided became the basis of the *comitia centuriata*, a popular assembly which finally superseded the older *comitia curiata* in its most important political functions.

After the expulsion of the last Tarquin, a republic was established under the presidency of two consuls chosen only from the patricians, and invested, except in religious matters, with the full authority of the kings. From their decision an appeal lay to the popular assembly; in time of great public danger a dictator was given sovereign power for a term not exceeding six months. Abt. 494 the plebeians, unable to secure their rights, seceded, but a compromise was effected; plebeian tribunes were created, and the plebeians were allowed to elect two ædiles. The first free election was held abt. 470. The city was ruled by a despotic decemvirate, 451–449. According to some, the first consuls were elected 449. Veii, the most important city of the Etruscan League, was taken by the Romans, 396. The Gauls under Brennus took and sacked Rome, 390, but the Gallic invasion weakened the Etruscans, and made Rome the defender of the rest of Italy. The Licinian rogations, providing among other

things that one of the consuls should be a plebeian, were passed 367; the curule ædileship, to which members of both orders were eligible, was created at this time. The Publilian laws, transferring the election of tribunes from the *comitia centuriata* to the *comitia tributa*, in which the whole people met in their tribal divisions, were passed, 338. Wars with the Samnites (343–290) led to the subjection of their Etruscan and Umbrian allies, and the defeat of Pyrrhus, 275, put an end to the independence of the Greek cities in the S., and left Rome mistress of Italy.

War with Latium (340–338) led to the incorporation of the cities of the Latian League with Rome. The passage of the Ogulnian law (300) opened the pontificate and the augurate to the plebeians, and is considered as the establishment of the Roman constitution. The last secession of the plebeians (286) was appeased by the enactment of the Hortensian laws, which gave the people supreme legislative power, and took from the senate its veto on their action. The first Punic War (264–241) resulted in the wresting of most of Sicily from the Carthaginians and the annexing of the possessions of Carthage in Sardinia and Corsica. In 256 M. Regulus and his colleague, Manlius, defeated the Carthaginians in the greatest sea fight of those days. In the Gallic War (225–221) the Roman arms were carried far toward the Alps; (229–228) Illyria was conquered. The second Punic War (218–204), initiated by Rome, was accompanied by the invasion of Italy by Hannibal, who gained control of the Po valley and the S. part of the peninsula, but failed to capture Rome. The defeat of his brother, Hasdrubal, on the Metaurus, destroyed his hopes of obtaining reinforcements, caused him to return to Africa, where the Romans under Scipio gained the victory of Zama, and ended the war. Spain, which Carthage had conquered, was ceded to Rome, and the supremacy of Carthage was at an end. Macedonia, having aided Carthage, Rome made war on the former (214–205 and 200–197). In 197 Philip V of Macedon was defeated at Cynoscephalæ, and Roman influence was practically established over Greece. War with Syria (192–189) gave Rome Magnesia and Asia Minor.

The third Macedonian War (171–168) ended in the division of the Macedonian kingdom and the formation of the Roman province of Achaia. The third Punic War (149–146) led to the destruction of Carthage and the formation of the Roman province of Africa. War in Spain (149–133) ended with the capture of Numantia, and (140) Lusitania was annexed to the empire. Tiberius Gracchus, elected tribune of the people (133), and his brother Gaius (elected 123), attempted in vain to remedy the evils growing out of the Roman land system. War with Jugurtha, King of Numidia, was terminated (106) by Caius Marius, whose further success in repelling the invasion of the Cimbri and Teutones made him, though of humble origin, the leading man in Rome. In 90 Rome's Italian allies, debarred from the suffrage, and misruled by Roman magistrates, revolted, established the State of Italia, and were subdued (88) only after the rights of citizenship had been extended to all Italy S. of the Po. War against Mithridates, King of Pontus (88–84), was carried on under Sulla, a member of the aristocratic party. A revolt of the popular party occurred, the result of the rivalry between him and Marius, and on his return (83) a civil war broke out, the result of which was Sulla's installment as perpetual dictator. New wars with Mithridates (83–81 and 74–64), in which Pompey acquired especial distinction, ended in the annexation of Syria and Judea.

Meanwhile (73–71) the great servile insurrection under Spartacus took place. Cataline's conspiracy against the republic (63) was frustrated by Cicero. Through the first triumvirate, Cæsar, Crassus, and Pompey became virtual masters of their country. Civil war between Pompey, leader of the aristocratic party, and Cæsar (49–48) resulted in Cæsar's victory, and his creation as perpetual dictator, with the title of imperator. His nephew and successor, Octavian, formed with Mark Antony and Lepidus the second triumvirate (43). The defeat of the republicans under Brutus and Cassius (42), and that of Antony at Actium, left Octavian master of Rome, and he took the title of Augustus (27), from which year the formal establishment of the Roman Empire is usually dated. Egypt was made a province. Augustus was succeeded by Tiberius, his adopted son (14 A.D.); Tiberius by his grandnephew, Caius, known as Caligula; then came Claudius and Nero (54–68). The reigns of the Emperors Galba, Otho, and Vitellius covered the short period of a year (68–69). The Flavian family came to the throne (69) in the person of Vespasian. His son and successor (78) was Titus, the conqueror of Jerusalem. Domitian, the tyrant, succeeded (81); was followed by the humane Nerva (96), and he (98) by Trojan, who carried the Roman arms to the Persian Gulf. After Hadrian (117–138) and Antoninus Pius (138–161) came Marcus Aurelius Antoninus, whose wars with the Marcomanni began the long conflict with the German invaders. From the year of the accession of the tyrant, Commodus (180 A.D.), Gibbon dates the commencement of the empire's decline. At that time the empire consisted of Italy, Spain, Gaul, Britain, Rhætia, Noricum and Pannonia, Dalmatia, Mœsia and Dacia, Thrace, Macedonia, and Greece; Asia Minor, Syria, Phœnicia, and Palestine; Egypt and all the N. of Africa; and the Mediterranean with its islands.

Pertinax, successor of Commodus, was assassinated (192) by the Pretorian guards, who sold the empire to Didius Julianus, to whom succeeded Septimius Severus (193). Severus's son, Caracalla, and the latter's successor, Elagabalus (218–222) rivaled Nero in infamy. The edict of Caracalla (212) conferred citizenship on all free inhabitants of the empire and hastened the assimilation of Italy and the provinces. Most of the emperors who reigned later—Maximilian, Valerian, Tacitus, Numerian, and others—were men of little ability, down to Diocletian. Alexander Severus (222–235), Decius (249–251), and Aurelian (270–275) are the principal exceptions. Diocletian

(284–305) associated with himself a colleague, Maximianus; and later two others, with the subordinate rank of cæsar, each of the supreme rulers being henceforth styled Augustus. Diocletian resided principally at Nicomedia in Bithynia; Maximianus, at Milan. Constantine the Great (323–337), sole ruler, made Christianity the religion of the empire, and (330) transferred the capital to Byzantium (Constantinople). He divided the empire between his three sons, but the whole finally came into the possession of the second brother, Constantius (351). Julian (361–363) restored paganism, but it died with him. Jovian and Valentinian I succeeded, the latter appointing his brother Valens as his colleague. During Valens's reign (364–378) the Goths ravaged the whole country to the walls of Constantinople. Gratian, his successor, chose as his colleague Theodosius, called The Great, and caused him to be proclaimed Emperor of the East. Theodosius became sole emperor (394). On his death (395) his sons, Arcadius and Honorius, ruled at Milan and Constantinople respectively, the empire having been divided. In law there was but one empire, but the two divisions were never again united except in name. The E. remained Greek; the W. provinces fell away to the Germanic invaders. Rome was sacked by the Visigoths (410) and by the Vandals (455). Control of the empire passed more and more into the hands of German leaders, and (476) Odoacer deposed the Emperor Romulus Augustus, and ruled Italy as a German king.

ROME AFTER 476 A.D.

The full supremacy of Rome may be referred to the time of Pope Gregory, "The Great" (590–604). Meantime all Italy had been overrun by the Goths and Germans, Rome's ancient laws ceased to be enforced, the country was divided into duchies governed by foreign masters, and the Lombards in the N. were powerful enough to give a German character to the whole peninsula. A schism in the Church between the Arians and Roman Catholics having been turned into a victory for the latter by Gregory, the Church increased its strength at home and extended its power abroad. Pepin, of France, having been crowned King of the Franks by Pope Stephen III, returned the favor by driving out the Lombards, giving their lands to Stephen, and thus laying firmly the foundation of the secular power of the popes. Charlemagne, Pepin's successor, after bloody campaigns, was consecrated by Leo III Emperor of Rome and protector of Christendom (800). After a long period of turbulent warfare in Italy, Otho, the German emperor, was appealed to, and (962) was crowned in Rome, whose sovereignty he restored to himself and his successors.

The period of Roman history during the reign of the three Othos is full of shame and disgrace; owing to the division of authority, and the papal party and the imperial party—later known as the Guelphs and the Ghibellines—were in constant conflict. Hildebrand (Gregory VII) humbled the Emperor Henry, but was soon besieged in the Castle of St. Angelo by that monarch, and owed his rescue to Norman troops under Guiscard. Crusaders, German armies, and lawless bands of soldiers ravaged Rome by turns, and in the thirteenth century the city suffered fearfully. The popes were confined to their castle, and yet their power abroad was greater than ever. A revolt against the popes (1146–54), in which Arnold of Brescia was prominent, was quelled by Adrian IV. Innocent III (1198–1216) claimed the government of the whole world, basing his rights on divine ordinances and sustaining them by the weapons of excommunication and interdict. During the residence of the popes in Avignon (1309–77) Rome became a complete prey to anarchy. Cola di Rienzi, who made himself master of Rome and even most of the Italian states (1347), restored law and order, but this "last tribune of the people," as he styled himself, was murdered. At that time Rome, depopulated by wars and tumults, counted less than 20,000 inhabitants.

In 1417 a new era began, during which vast wealth accumulated in Rome, and the Renaissance came into flower in Italy. The long wars between France and Spain secured the primacy in Italy to the latter power, and the increasing power of Protestantism absorbed all the energies of the popes. Gregory XIII's reformation of the calendar gave him unusual eminence in the annals of Rome. Sixtus V (1585–90) restored peace to Rome, the power of the nobles was broken, and property and life were once more safe. During the seventeenth century the popes lost their influence in the world, and nepotism prevailed in the Church. In 1796 a French army conquered the N. provinces, and threatened Rome, which was saved only by the payment of large sums. Soon after a new invasion occurred; the French took possession of Rome, the pope was made a prisoner, and Rome was formally annexed to France (1809). In 1814 the city became free once more, and the pope returned. A rebellion (1848) drove out Pius IX, and a republic was established under Mazzini, Armellini, and Saffi. An appeal to France brought a French army to the city gates. Rome was taken (1849), the republic was suppressed, and the pope was reinstated. French troops garrisoned the city till 1870. When they were withdrawn, Italy had become a nation, and Rome by an overwhelming majority had voted for annexation. The seat of government was transferred from Florence to Rome (July 2, 1871). King Victor Emmanuel made his formal entry into the new capital, and (November 27th) opened the first session of the Italian Parliament in that city. Rome presents the strange anomaly of being the residence of two sovereigns—one ruling over Italy, the other over the consciences of all the members of the Roman Catholic Church.

Rome, city in Oneida Co., N. Y.; on Mohawk River; at junction of Erie and Black River canals; 15 m. NW. of Utica; contains a hospital, State Custodial Asylum for Incurable Insane, Central New York Institution for Deaf-mutes, St. Peter's Academy (Roman Catholic), Jarvis, Y. M. C. A., and Union Free School libraries; is in a noted dairying region; central factory system of cheese and butter making originated here; other industries include locomotive works, brass and copper mills, metal

bedstead works, knitting mills, brickyards, breweries, canning factories, etc. The heart of the city is the site of Fort Stanwix, erected 1758, which was a post of great importance during the French war of that year. The fort was also the scene of stirring events in July and August, 1777, when the British under St. Leger were defeated by the Tryon Co. militia under Gen. Herkimer in the battle of Oriskany. Rome was incorporated as a village, 1819, and chartered as a city, 1870. Pop. (1910) 20,497.

Ro'mer, or Roemer, Ole, 1644–1710; Danish mathematician and astronomer; b. Aarhuus; was invited to Paris, 1672; appointed teacher in mathematics to the dauphin, and made a member of the Academy of Sciences; assisted Picard in his meridional measurements, invented the transit instrument, and determined the velocity of light; appointed Prof. of Mathematics and Astronomy at the Univ. of Copenhagen, 1681, and held several civil offices.

Rome Scot. See PETER'S PENCE.

Rom'illy, Sir Samuel, 1757–1818; British jurist; b. London; called to the bar, 1783; became eminent as a chancery lawyer, and was appointed king's counsel, 1800; chancellor of the county palatine of Durham, 1805; knighted, and made Solicitor-general and elected M. P., 1806. His great work was his attempt to reform English criminal law, which he began, 1807; besides which he advocated the abolition of the slave trade, Catholic emancipation, and electoral reform. His perseverance, his continual protesting against the severity of the criminal law, and the barbarous frequency of capital punishment (which was the cause of the laxity in its enforcement), led to the final reformation of the criminal law of England.

Rom'many Race and Lan'guage. See GYPSIES.

Rom'ney, George, 1734–1802; English painter; b. Dalton, Lancashire; 1762, settled in London, and, 1763, obtained a prize for his "Death of Gen. Wolfe." After his return from Italy, 1775, he was a popular painter of portraits, and a rival of Sir Joshua Reynolds. The Metropolitan Museum, New York City, has his "Lady Hamilton as Daphne."

Rom'ulus, legendary founder of Rome (abt. 753 B.C.). Amulius, King of Alba Longa, robbed his brother Numitor of his regal rights, and made his daughter, Rhea Silvia, a vestal virgin. By the god Mars she had two children, Romulus and Remus, whom Amulius ordered to be thrown into the Tiber. The basket in which they were placed was left on dry land. A she wolf suckled them, and Faustulus, the king's herdsman, brought them up with his own sons. When they had grown up, a quarrel with the herdsmen of Numitor resulted in the discovery of their birth, the killing of Amulius, and the restoration of Numitor. The brothers determined to build a city on the Palatine, and augury was to decide which should give it his name. First six vultures appeared to Remus, and then twelve to Romulus, who came off victor. Remus mocked at the ramparts of the new city, and was slain by his brother. Romulus made Rome a place of refuge; but the neighboring people would not give the Romans their daughters in marriage.

Romulus announced the celebration of games, and the Roman youth carried off the Sabine and other women who had come to see them. Wars were the consequence. Through the treason of Tarpeia, the Sabines got possession of the fortress on the hill Saturnius, and a battle ensued at the foot of the hill. While it was raging, the women who had been carried off ran down from the Palatine, and implored their husbands and their fathers and brothers to stop the carnage. Peace was made, and the two peoples became one, under Romulus and the Sabine king, Titus Tatius. Tatius not long afterwards was slain by the inhabitants of Laurentum, and Romulus reigned over the whole people, divided by him into three tribes. He waged many wars, with constant success. After a long reign he disappeared in a storm. The people, judging that he had become a god, worshiped him under the name of Quirinus. Numa Pompilius succeeded him (abt. 716).

Roncesvalles (Spanish, rōn-thĕs-väl'yĕs), French, RONCEVAUX, small Spanish village, province of Navarre; in a narrow valley on the S. side of the Pyrenees; famous as the place where Charlemagne, on his retreat from his campaign against the Mohammedans, 778, was attacked, and his whole rear guard destroyed. Among those slain in this battle was the half-mythical hero, Roland. In the French-Spanish wars several bloody encounters (1793, 1794, 1813) occurred in the same valley.

Ron'do, in music, a composition in which the theme, as it is given in the first strain, returns upon itself in the last, after passing through various expansions and elaborations.

Ronsard (rōn-sär'), **Pierre de,** 1524–85; French poet; b. Château de la Poissonnière, Vendômois; educated at the French court as page to the Duke of Orleans; followed James V to Scotland; returned to the Duke of Orleans, 1541, and was sent on various embassies to Flanders, Holland, and England; lost his hearing, and retired to the Collège de Coqueret. Among his companions here were Baïf, Belleau, Muret, Jodelle, and Du Bellay, and among them sprang up that new literary ideal whose first representative Ronsard became. It broke completely with the ideals and traditions of the Middle Ages and the older native literature, and substituted the classical models of the Latin and Greek literatures. Ronsard and his eager followers, styling themselves the Pléiade, threw themselves on the task of creating a French literature in the image of the classical models. In 1550 appeared four books of "Odes"; 1552, his "Amours"; 1555, his "Hymnes"; other poems, including "Elégies" and "Discours," at intervals; and, 1572, four books of his epic, "La Franciade," never finished. His influence on the French language and letters was enormous, though his popularity waned rapidly after the advent of Malherbe.

Röntgen (rĕnt'gĕn), **William Conrad** (Baron), 1845– ; German physicist; b. Lennep, Prus-

sia; became assistant Prof. of Physics at Strassburg, 1873; Prof. of Mathematics and Physics at Hohenheim, near Stuttgart, 1875; professor and director of Univ. and Institute of Physics at Giessen, 1879; Prof. of Physics at Würzburg, 1888; at Munich, 1899. On November 8, 1895, he discovered that by the use of the power of penetrating metals and other opaque bodies, possessed by certain rays emanating from tubes with high vacua, he could photograph hidden objects, such as the bones of the hand within the flesh, a set of weights in a box, a compass card and needle inclosed in a metal case, etc. For this discovery the Emperor of Germany bestowed on him the Order of the Royal Crown, and Prince Ludwig of Bavaria the title of baron.

Rood Screen. See CHOIR.

Roof, covering of a building. As generally used, the term includes the covering and the framework which supports it, though in carpentry the use of the word is restricted to the latter meaning. Roofs vary greatly in the form and material, and require a higher degree of skill and science than any other part of a building. Greek temples were covered with long, thin pieces of marble; the roofs of the halls of the ancient Assyrians and Babylonians consisted of exceedingly large stones, some of them so big as to cover a whole room singly. In the East there are remains belonging to prehistoric times of buildings of a circular shape, in which a column standing in the center was evidently intended to support rafters whose outer ends rested upon the inclosing wall.

The inclination or pitch of a roof is generally a matter of taste alone and not of climate, though with some coverings a certain inclination is necessary. In England and in France, in the later times of mediæval architecture, the roof underwent a very different development; in the former country, though of a higher latitude, it became flatter; in France and in Germany, high and steep. To the flat roofs were added parapets, and the church towers were built without spires and were furnished with parapets. In France the roof grew with the rest of the building, and on the tower, when spires had fallen into disuse, it assumed almost the inclination if not the place of the spire. In Persia and Arabia the roofs are flat; in Greece, invariably sloping, made on an angle of about 16 degrees with the horizon; in Rome, on an angle of about 24 degrees. In hot climates the chief reason for the flatness of the roofs is that they may serve as terraces in the cool of the evening and morning, and for this purpose they are covered with concrete or cement, carried on joists like a floor.

When the base is a circle, an ellipse, or a polygon, and its vertical section a curved line concave toward the interior, the roof is termed a dome or cupola. Different names are given to roofs, according to their forms; thus, Fig. 1 is a gabled roof; Fig. 2 a gambrel, curb, or mansard roof (the term mansard is from a French architect, Mansart, who died in 1666); Fig. 3, a conical roof. Fig. 4 shows a very simple frame for a roof, consisting of two rafters resting at their lower ends upon the wall or frame of the house; sometimes the rafters are prevented from spreading by a collar beam uniting them near their lower ends. In roof framing, the simplest form of truss is that known as the "king-post" truss (Fig. 5), consisting of a triangular frame, A being the ridge, in which the middle portion of the triangular piece, or tie beam, E, is secured to the junction

FIG. 1.

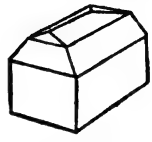


FIG. 2.

FIG. 3.

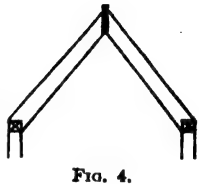


FIG. 4.

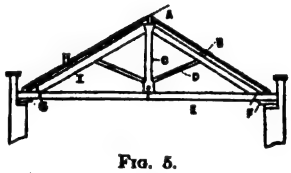


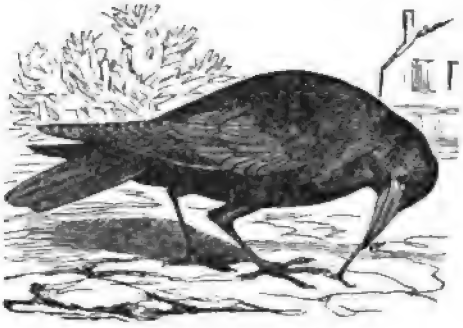
FIG. 5.

of the inclined timbers, or main rafters, I, by a vertical post called the "king post," G. Several of these frames are placed parallel with one another to support the roof covering, and are connected by longitudinal pieces called "purlins," B. Over the latter, and parallel with the main rafters, are the common and lighter rafters, H, distributed at short intervals; on these the boarding is laid, and over all the slate, tin, or other covering. The "queen-post truss" consists of a horizontal tie beam and main rafters; the latter do not meet, but abut against a horizontal "straining beam," which is also held at each end, and at the proper height above the tie beam, by queen posts.

Roof of the World, term applied to the Pamirs in central Asia; part of plateau is 16,000 ft. high.

Rook, bird (*Corvus frugilegus*) of the family *Corvidæ*, closely related to the common crow, which it also resembles nearly in size (it is a little smaller), as well as black color; but distinguished therefrom by the bill being little longer than the head, and in the adult naked at the base; the first primary is shorter than the eighth, the second shorter than the fifth, and the third and fourth are the longest. It is generally distributed throughout Europe and E. Asia. It lives in communities known as rookeries; these sometimes are very populous, occasionally containing from 2,000 to 3,000

nests, and a corresponding number of birds of different ages and sizes. In Great Britain they



ROOK.

are considered by many an attractive feature in the landscape, and are therefore protected.

Roosevelt (rōs'vĕlt), **Theodore**, 1858–1919; twenty-sixth President of the U. S.; b. New York City; son of Theodore Roosevelt, merchant and philanthropist; grandson of Archibald Bulloch, first president of Georgia in the Revolution; graduated at Harvard, 1880; began study of law, but abandoned it for politics; first elected to the state assembly, 1881; served on the Cities Committee in his second year, and became its chairman, 1884; was active in promoting the passage of the first New York civil-service laws; chairman of a committee that investigated abuses in New York City, and secured acts abolishing the fees in county offices, and depriving the aldermen of veto power over the mayor's appointments. He was a delegate at large to the Republican National Convention (1884), and favored the nomination of Edmunds, but in the campaign supported Blaine; unsuccessful candidate for the mayoralty, 1886; civil-service commissioner, 1889–95; president of New York City Board of Police Commissioners, 1895–97, and enforced the Sunday and liquor laws against much opposition.

Appointed Assistant Secretary of the Navy, April, 1897, took part in the preparation for war against Spain; resigned, 1898, and raised a regiment of volunteer cavalry, popularly known as ROUGH RIDERS; became lieutenant colonel under Dr. Leonard Wood. Col. Wood was promoted brigadier general, July 8, 1898, and Lieut.-col. Roosevelt became colonel. In November, 1898, Col. Roosevelt was elected Governor of New York by the Republicans, receiving a plurality of 17,786 over Augustus Van Wyck, Democrat. As governor he reformed the administration of the canals, favored the enactment of a civil-service law, applied the merit system in county offices, and induced the legislature of 1899 to pass an act taxing as real estate the value of railroad and other franchises to use public streets.

Early in 1900 was mentioned for Vice President of the U. S., but desiring a second term as governor, announced that under no circumstances would he accept the higher office; at the Philadelphia Convention, June 21st, was forced to accept, by a combination of New York party leaders and W. delegates. After a speaking tour of the W. [illegible]es he was elected for the term beginning March 4, 1901, receiving 292 electoral votes against 155 cast for Adlai E. Stevenson, Democrat. On the afternoon of the day Pres. McKinley died, September 14, 1901, he took the oath as President of the U. S. in a private residence in Buffalo, and on that occasion asserted his purpose to continue the policy of McKinley. Among the measures that became laws were the following: Chinese Exclusion Act, Panama Purchase Act, providing for the construction of the canal; act to repeal war-revenue taxation; act appropriating receipts from sale and disposal of certain public lands for the construction of irrigation works; act permanently organizing free delivery; acts to establish Department of Commerce and Labor, increase the efficiency of the army, and to regulate the immigration of aliens.

At the presidential election of 1904 he received 336 electoral votes to Alton B. Parker's 140 (the Democratic candidate). Among congressional acts during his second administration were the passage, 1905, of the Railroad Rate Bill; prosecution of the sugar trust; the Standard Oil Company for restraint of trade while under the Interstate Commerce laws; also other trusts and various railroads; general arbitration treaties with sixteen American republics and seven European nations were made; also a commercial treaty with China. Acts were passed to raise the salaries of the Vice President, Speaker, Congressmen, Cabinet members, ministers abroad, and postal clerks and carriers; to reorganize the consular service on a merit basis; to establish a Bureau of Immigration and Naturalization; for the inspection of meat; to prevent the manufacture, sale, and transportation of adulterated, misbranded, poisonous, or deleterious foods, drugs, medicines, and liquors; to provide for the construction of a canal between the Atlantic and Pacific; to impose penalties on railroads for injuries to employees; to admit Oklahoma as a state.

On June 8, 1905, Pres. Roosevelt took the initiative in negotiations to bring about peace between Russia and Japan, and, these having been successful, was awarded the Nobel Prize for his work for the fraternization of nations. In 1902 and 1906 he used his personal influence to avert a coal strike in Pennsylvania. In 1906 he visited Panama, this being the first time a President of the U. S. had passed beyond the jurisdiction of its flag, and also visited Porto Rico. Immediately upon the inauguration of his successor, William H. Taft, he sailed for S. Africa, accompanied by eminent scientists, on a big-game hunting expedition, remaining in that country about a year. In 1908 he became contributing editor of the *Outlook*. In 1912 he was refused the regular Republican nomination and accepted the nomination of the new Progressive Party, at the head of which he made an unsuccessful campaign for the Presidency. His offer to raise and lead a military division for the World War was rejected by the government. He earnestly championed the Allied cause, and had four sons in the war, one of whom, Quentin, was killed in action. He was a voluminous writer, especially on historical and hunting subjects.

Roots (of plants). See BOTANY.

Rope and Rope Mak'ing. The stouter forms of cordage, and especially of those whose circumference exceeds 1 in. are called rope; usually made of hemp, which is first hackled or combed out to remove the dust and tow, the hackle consisting of a strong board with long vertical steel prongs sharply pointed.

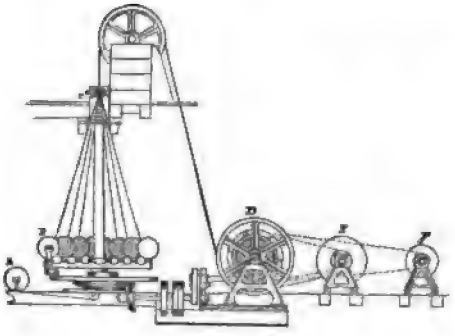


FIG. 1.—A TWELVE-FLYER MACHINE, FOR FORMING THE STRANDS. *A*, heart; *B*, bobbins; *C*, top and tube; *D*, draw-off drum; *E*, bobbin for larger sizes; *F*, bobbin for smaller sizes.

The size of the yarn varies according to the kind of rope for which it is intended. Forties —so called because forty yarns will just fill a half-inch tube—are for the finer kinds of rope; twenties, requiring twenty to fill the tube, are for cables, hawsers, etc. The bobbins containing the tarred yarn go to the laying ground, when the yarns are ready for hauling down, or making into strands. The laying ground, where the rope is laid up, occupies the entire length of the ropewalk. The yarns for the strands (Fig. 1), generally three in number, are led from the bobbins in the frame through holes bored on concentric circles in a metallic plate, thence through a tube adapted to the size of the strand, and attached to a hook on the end of a spindle in a movable machine like a car, called the former. There are a plate, a tube, and a hook for each strand, and the number of yarns to a strand is regulated by the size of the intended rope.

When the machinery is put in motion, the former is drawn down the walk, and the yarns as they are hauled through the tubes are formed into left-handed strands. Closing the strands is the next step, for which two machines are used. The lower one—the layer—lays up or closes the rope, and is movable; the upper one, which keeps the proper twist in the strand while laying, is stationary. Each strand being secured to its proper spindle, the machinery is put in motion and the strands hardened. After hardening, the strands are placed together on a central spindle of the layer and closed, a top inserted between them preventing too rapid closing. The top is a wooden cone with grooves cut to hold the strands, while tails of soft rope attached to it, by being applied to the rope as it is made, still further prevent, by the additional friction, the too rapid closing of the strands. The layer makes two revolutions to one of the upper machine. The foregoing process gives right-handed tarred rope of three strands (plain laid). By not tarring the yarns white rope is produced. This is the strongest, though when exposed to the weather not the most durable, of all in common use.

In the manufacture of manila rope hackling by hand is omitted, as unnecessary; the manila is oiled to enable the harsher fiber to pass the more readily through the preparation machines, and the yarns are not tarred; the remainder of the process is the same in both cases. The size of rope is designated by its circumference; when smaller than 1¼ in. it is known as "small stuff." Three ropes laid up together form a cable or hawser of nine strands.

Wire rope may be made either of 49 coarse wires or 133 fine wires, put in 6 strands, and 7 or 14 hearts, and laid up right handed; strands are laid left handed (Fig. 2). To make a 7-in. fine wire rope, the bobbins of a 6-flyer machine are filled with No. 8 wire, Birmingham gauge, and for the heart a single wire is led from its bobbin up through the vertical shaft. This will form a 7-wire heart for the strands. Next the bobbins of a 12-flyer machine are filled with the same size wire, placing the heart as in the illustration. Then all the wires are passed up through holes past the top, arranged through the grooves of the top, twisted together by hand, spliced in a piece of rope, and passed five or six times around the draw-off drum. Friction straps attached to the bobbins preserve an equal tension on the wires. Putting the machine in motion, the 7-wire heart is drawn up the shaft, and at the same time the 12 single wires are wrapped about it as the disk revolves, each separate bobbin turning on its own center in an opposite direction, so as to avoid twisting the wire. As the strand is formed it is reeled on a bobbin.

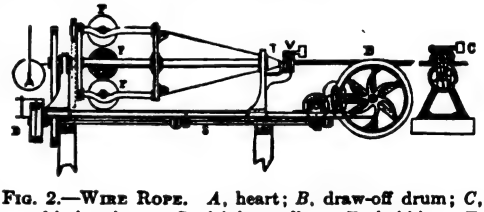


FIG. 2.—WIRE ROPE. *A*, heart; *B*, draw-off drum; *C*, friction drum; *D*, driving pulley; *F*, bobbins; *T*, top; *V*, tube; *S*, driving shaft.

Having filled 7 bobbins, 6 are placed in a machine, as in the illustration, and 1 in the rear for a heart. The heart, on motion being given to the machinery, is drawn through, and the 6 strands wrapped about it, giving 1 central and 6 outer strands of 19 wires each. In making strands for wire rigging it is the practice to substitute hemp for the single wire of the heart, and to make a hemp heart for the rope. When flexibility is required, annealed wire is used and hemp hearts supplant the wire ones, and a hemp heart takes the place of the central strand or wire heart. In this case there will be 18 wires to each of the 6 strands, making a total of 108 wires in all, instead of 133 as before. So if a twine heart in each strand be substituted for the wire, there would be a

wire heart in the rope of 6 wires, laid up in 6 strands of 6 wires each; total, 42 wires, instead of 49, as above stated. Steel wire is about 56 per cent stronger than iron wire and 65 per cent stronger than annealed iron wire.

Roquefort (rōk-fōr'), small town of Aveyron, France; 10 m. SW. of Millau; on mountain 4,800 ft. high; famous for the cheese bearing its name, and made from ewe milk.

Rora'ima, Mount, highest of a number of isolated sandstone plateau-topped mountains discovered by Robert Schomburgk on the boundary line he surveyed between Venezuela and British Guiana; is 9,000 ft. high, and its upper 2,000 ft. was long supposed to be a perpendicular wall. Everard im Thurn, December, 1884, found on one face a narrow ledge that afforded a pathway to the summit. The soft sandstone of the plateau at the top had been carved by denudation into many remarkable forms. There are no trees, and the general character of the plants is dwarfish and almost alpine.

Ro'ric Fig'ures, certain curious images rendered manifest on breathing on polished solid surfaces previously exposed to contact with or close proximity of the objects thus represented, and usually at the same time acted on by light, heat, or electricity. The singularity of these phenomena is, that they consist usually in the production at the first of a sort of latent or invisible image, which may afterwards be developed somewhat in the manner of photography. Möser, of Königsberg, first distinctly called attention to these figures (1842); his statement being to the effect that generally, when two bodies are sufficiently near, they impress their images on each other. Mr. R. Hunt placed on a copper plate, too hot to be handled, coins and medals of gold, silver, bronze, and copper, and allowed the whole to cool; removing the objects, exposing the plate to the vapor of mercury, and wiping off any nonadherent mercury, he found that the coins had made distinct impressions on the surface. Karsten laid a medal on a glass plate, resting on one of metal, and allowed a few sparks from an electrical machine to fall on the medal; the image on the glass is brought out by vapor of mercury, iodine, or the breath.

Ro'sa, Francisco Martinez de la. See MARTINEZ DE LA ROSA, FRANCISCO.

Rosa, Pietro, abt. 1815–91; Italian archæologist; b. Rome; educated as an architect, but, 1848, became almost exclusively interested in archæological researches in Rome and its vicinity. One of his early undertakings was a large-scale map of Latium, with the ancient sites determined, but the constant succession of new discoveries, overturning old theories, kept this work in hand and unfinished for many years. Meantime he was busied on the tombs of the Appian Way and their theoretical restoration. In 1861 the French Govt. charged him with the study of the camp of the Pretorian Guard at Albano, and of the buildings on the Palatine Hill. In 1872 and later he conducted important researches in the Roman Forum, and was director of these at the time of the discovery of the Basilica Julia.

Rosa, Saint (commonly called ST. ROSE OF LIMA), 1586–1617; only canonized saint of American birth; b. Lima, Peru; parents wealthy Spaniards; but their fortune having been swept away, Rosa supported them by her labor, while following her bent for asceticism; assumed the habit of the third order of St. Dominic, and lived a recluse; canonized 1671; day, August 30th.

Rosa, Salvator, 1615–73; Italian painter; b. near Naples; early life explored the wildest regions of Calabria, associating with banditti, in the interest of his art, which he afterwards practiced in Naples, Florence, and Rome, gaining fame also as a poet, musician, and actor. Among his most celebrated works are the "Catiline Conspiracy," "Saul and the Witch of Endor," "Attilus Regulus," and altarpieces. He is best known as a landscape painter, delighting in gloomy effects, powerful contrasts of light and shade, and romantic forms. He also excelled as an engraver.

Rosa, Mon'te, mountain group at the E. extremity of the Pennine Alps; on frontier line between Italy and the Swiss canton of Valais; is, after Mont Blanc, the loftiest mountain of the Alps, the highest peak being 15,150 ft. above the sea. All the summits of Monte Rosa are composed of gneiss and white mica slate, and all have been ascended.

Rosa'ceæ, family of polypetalous dicotyledonous trees, shrubs, and herbs, comprising over 1,000 species, mostly of temperate regions. The rose, apple, pear, quince, cherry, plum, peach, apricot, almond, blackberry, raspberry, strawberry, etc., belong to this family. It divides into marked suborders, of which the following are the principal: (1) *Amygdaleæ*, or the almond family, with a single simple and free pistil, becoming a stone fruit, such as that of peach, plum, and cherry. (2) *Rosaceæ* proper, with dry or berrylike fruits, from numerous or few (seldom single) free pistils, and stipules joined with the petiole. To this belong the small fruits above mentioned and a great variety of useful and ornamental plants, both herbs and shrubs. (3) *Pomeæ*, the apple family, with two or more pistils combined with each other and with a fleshy calyx tube, which forms the edible fruit.

Ros'amond (Lombard queen). See ALBOIN.

Rosamond (commonly called FAIR ROSAMOND), d. 1177; favorite of King Henry II of England; daughter of Walter, Lord Clifford; lived at Woodstock, where Henry frequently visited her, and bore to him William Longsword, Earl of Salisbury, and Geoffrey, who was nominated Bishop of Lincoln.

Rosa'rio, city of province of Santa Fé, Argentina; on W. side of delta of the Paraná, 214 m. by the river above Buenos Aires. Urquiza, in his struggle against the supremacy of Buenos Aires, made it the chief port of the confederated provinces (1854), and since then it has grown rapidly. It is the second city of the republic in size and importance, and is con-

nected with the interior by a network of railways; transatlantic steamers ascend regularly to this point. Almost exclusively a commercial place, it is chiefly remarkable for its great elevators and storehouses. Pop. (1907) 150,000.

Ro'sary, (1) a series of prayers prescribed by the Roman Catholic Church. The greater rosary is a synonym for the whole series, and is made up of three lesser rosaries. Each of the three lesser rosaries contains five decades or mysteries. Each decade contains one meditation on one of the fifteen mysteries of the faith, one Pater Noster, or repetition of the Lord's Prayer, ten Ave Marias, and one Gloria Patri. (2) The chaplet or string of beads used in the repetition of the rosary. The Pater Nosters are marked by large beads, and the Ave Marias by smaller ones. The beads are of various materials, and are blessed by the pope or by some duly authorized ecclesiastic. The beads serve as counters during the recitation. There are various forms of rosaries; that generally used has fifty-five beads—namely, five decades of Ave Maria beads and five Pater Noster beads. The Confraternity of the Rosary was founded at Cologne, 1475.

Rosary Sun'day, first Sunday in October; a feast instituted by Gregory XIII for the Confraternity of the Rosary, and made of universal observance after the victory of the Emperor Charles VI over the Turks, in gratitude to the Blessed Virgin. An impetus was given to the devotion of the rosary by Leo XIII, who enjoined its daily use in public during October. Roses are blessed and distributed as souvenirs, and the rosary is recited continually during the day.

Roscelin (rŏs-ĕl-ăn'), French theologian and principal founder of Nominalism; b. Soissons in middle of eleventh century; was attached to the Cathedral of Chartres; lived at Compiègne as canon; while there greatly startled people by his tritheistic conception of the Trinity. He could not understand how God could be a person without being an individual, and thus he dissolved the Trinity into three Gods. A synod was convened at Soissons, 1092, to consider the matter, and Roscelin was condemned and recanted, but continued, nevertheless, after his return to Compiègne, to propagate his tritheistic doctrines. He afterwards settled as a teacher at Tours, and later at Locmenach, near Vannes, in Brittany, and to this last period of his life belongs his controversy with Abelard. After that time (1121) Roscelin disappears from history.

Roscius (rŏsh'ĭ-ŭs), **Quintus,** d. 62 B.C.; celebrated Roman actor; contemporary of Sulla and Cicero, who in his youth received instruction from him, and subsequently defended him in a civil lawsuit in an oration still extant. He was especially great in comedy, and carried his art to the highest degree of perfection which the Roman stage ever witnessed, accumulating an immense fortune. Cicero speaks often of him, and always with enthusiasm for his art and respect for his character.

Ros'coe, William, 1753–1831; English historian; b. near Liverpool; admitted to the bar 1774; took an active part in the agitation for the abolition of the slave trade; published "A General View of the African Slave Trade" and "An Inquiry into the Causes of the Insurrection of the Negroes in the Island of St. Domingo." In 1796 he published "The Life of Lorenzo de' Medici," translated into French, German, and Italian, and, 1805, "The History of the Life and Pontificate of Leo X." In a supplementary volume, "Illustrations, Historical and Critical, of the Life of Lorenzo de' Medici," he replied to various criticisms. In 1806 he was elected to Parliament.

Rose, flowering plant of the genus *Rosa* and family *Rosaceæ*, which consists of shrubs, usually prickly, natives of the N. hemisphere. There are more than a thousand recorded species. The most widely distributed N. American species are the Michigan prairie rose (*R. setigera*), with high-climbing branches—a native of the W. and S. states from Michigan to Louisiana and Georgia; the swamp rose (*R. carolina*), with stems 4 to 8 ft. high—a frequent inhabitant of low swampy ground from Canada to Florida and W. to the Mississippi; the dwarf wild rose (*R. lucida*), with stems 1 or 2 ft. high—common through Canada and the U. S., E. of the Rocky Mountains.

SWEETBRIER ROSE. (Section of Flower and the Fruit.)

The sweetbrier (*R. rubiginosa*), native of Europe, has escaped from cultivation, and become widely naturalized in the Atlantic states. The Cherokee rose (*R. sinica*), a native of China, has been naturalized in the S. states for over one hundred years, where it is also cultivated as a hedge plant. *R. bracteata*, a native of China and N. India, has also become naturalized in some of the Gulf states, where it is employed as a hedge plant, especially in deep rich soils.

A convenient classification divides garden roses into two sets—the first of summer or once-blooming, the second of autumnal or ever-blooming. To the first section belong the Provence roses, or cabbage roses, double forms of *R. centifolia*, favorite garden plants from the time of the Romans, and of which the pompon roses are dwarf varieties; also moss roses, descendants from an accidental bud variation of

the Provence rose, with the glands and bristles of the calyx and peduncle developed into a mossy substance. China roses are remarkable for vigor of growth, splendid blooms, and hardiness. Scotch roses are of dwarf stature and great hardiness, producing an early and abundant crop of red, white, and yellow flowers. Austrian briers give the best yellow rose for general cultivation. Queen-of-the-Prairie and Baltimore Belle are the most generally cultivated of the descendants of the prairie rose. To the summer roses also belong the sweetbrier (*R. rubiginosa*), of which many varieties are in cultivation.

To the second section belong Chinese roses, descendants of *R. indica* and *R. semperflorens*, now barely cultivated; tea roses, descendants of *R. indica*, and two varieties of this species with sweet-scented flowers, the blush-tea and the yellow-tea. From the intermingling of these two varieties has sprung the whole race of tea-scented roses. Musk roses are occasionally cultivated. Noisette roses, with flowers in clusters, were originated by M. Noisette, of Charleston, S. C., by crossing the China rose with the musk rose, the offspring being again crossed with the tea-scented roses. Bourbon roses are hybrids produced by crossing the China rose with some other rose of E. origin naturalized in the Isle of Bourbon. M. Laffroy, of Bellevue, near Paris, in 1840 produced the hybrid perpetual rose, which has as a basis some hardy once-blooming rose, often the hybrid China, with which has been mingled the blood of the ever-blooming China rose, tea rose, or Bourbon rose, or a combination of all three.

Roses should be cultivated in situations fully exposed to the sun, in deep strong loam well drained and heavily manured. Indeed, too much rich food can hardly be given them to develop their greatest beauties. The soil in which they grow should be constantly stirred and kept free from other plants, and especially from the roots of neighboring trees, while a careful watch must be kept for the many insects which feed on their leaves and petals. Strong-growing roses must be pruned slightly, that they may not be stimulated to excessive growth at the expense of the flowers; weak-growing roses must be pruned severely, to encourage more vigorous growth.

Rose, in heraldry, a conventionally drawn flower, having always five petals, and usually also five smaller inner petals and five green points of leaves showing on the outer rim. The rose gules was the badge of the Plantagenets, of the house of Lancaster, and the rose argent of that of York. The Tudor rose is a combination of the two, adopted after the marriage of Henry VII to Elizabeth of York; this is sometimes a white rose charged upon a red one, and sometimes a single rose quartered red and white. The rose was sometimes surrounded with rays, as of the sun, and termed *rose en soleil*. As a mark of cadency, the rose has been used as the difference of the seventh son.

Rose Aca'cia, ornamental shrub, the *Robinia hispida*, of the *Leguminosæ*, growing wild in the mountains of the S. parts of the U. S.; has large, very showy, inodorous flowers of a deep rose color in drooping loose racemes; common in cultivation.

Rose Ap'ples. See EUGENIA.

Rose'bery, Archibald Philip Primrose (fifth Earl of), 1847– ; British statesman; b. London; succeeded to title on death of his grandfather, the fourth earl, 1868; president of Social Science Congress, Glasgow, 1874; elected lord rector of Univ. of Aberdeen, 1878; lord rector of Univ. of Edinburgh, 1880; Under Secretary of State for the Home Department, 1881; Secretary of State for Foreign Affairs in Gladstone's government, January to June, 1886; appointed to same post, 1892; became Prime Minister on Gladstone's retirement, 1894, but gave place to Lord Salisbury, June 29, 1895; relinquished leadership of the Liberal party, October, 1896; lord rector of Glasgow Univ., 1899.

Rose Bug, common beetle, *Macrodactylus subspinosus*, of N. America; small and dusky yellow; very destructive, not only to the rose but to other vegetation. In warm weather it will suddenly appear in swarms and then suddenly disappear again, having completed its devastations, against which there seems to be no effectual remedy. In some cases air-slacked lime scattered over the bushes and under them seems to have the desired effect, but in other cases it has proved a complete failure. The same may be said of syringing the bushes with a decoction of whale-oil soap or of ailantus leaves.

ROSE BUG.

Rose of Jer'icho, popular name of *Anastatica hierochuntina*; a prostrate, branching annual, of the cruciferous family, inhabiting the deserts of Egypt and Palestine. After death the softer green parts disappear, leaving the woody framework; this rolls into a ball in drying, is uprooted by the winds, and rolls away. When wetted the branches expand, so that the plant seems to revive; hence its name, derived from the Greek anastasis, resurrection.

Rosecrans (rō'zĕ-krănz), **William Starke**, 1819–98; U. S. army officer; b. Kingston, Ohio; graduated at West Point and entered the engineer corps; Assistant Prof. of Engineering and Natural and Experimental Philosophy at West Point, 1843–47; engaged in fortification work till 1854; resigned and became civil engineer and architect in Cincinnati; brigadier general U. S. army, 1861; active in operations in W. Virginia; succeeded McClellan in command of that department; major general U. S. Volunteers, 1862, and placed in command of the Army of the Mississippi, and won the victories of Iuka (September 19th) and Corinth (October 3d, 4th). In October he was made commander of the Army of the Cumberland, and fought against Gen. Bragg the battle of Murfreesborough, or Stone River, December 26, 1862, to January 2, 1863; defeated by Bragg at Chickamauga, September 19th, 20th, and relieved from command. In January, 1864, he was placed in command of the Department

of Missouri; resigned, 1867; minister to Mexico, 1868–69; member of Congress from California, 1881–85; register U. S. Treasury, 1885–93; restored to army as brigadier general and retired, 1889.

Rose Mal'low. See HIBISCUS.

Rose'mary, labiate evergreen shrub, *Rosmarinus officinalis,* of Europe and Asia, having fragrant aromatic leaves which yield a pungent volatile oil, used as an ingredient in perfumery. Oil of rosemary is a principal ingredient of the perfume called Hungary Water or Queen of Hungary Water. The shrub, which reaches a height of from 4 to 8 ft., has linear leaves which are covered beneath with a short whitish-gray down and emit a penetrating camphorlike odor; the flower is pale bluish. It grows in sunny places, on rocks, old walls, etc., in the countries around the Mediterranean, and is generally cultivated as an ornamental and aromatic shrub in the W. of Europe. The rosemary may sometimes be smelled for many leagues off the Spanish coast. It affords excellent bee pasture.

ROSEMARY.

Rosenkranz (rō'zĕn-krănts), **Johann Karl Friedrich,** 1805–79; German philosopher; b. Magdeburg; Prof. of Philosophy at Königsberg, occupying the chair formerly filled by Herbart and Kant from 1833 till death; was the best representative of the "center" of the school of Hegel, and did much valuable work in rearranging and reclassifying the several parts of the system; chief works, "History of German Poetry in the Middle Ages," "Handbook of the General History of Poetry," "Encyclopædia of Theological Sciences," "Psychology, or Science of Subjective Mind," "Critical Explanations of Hegel's System," "History of Kant's Philosophy," "Pedagogics as a System of Science," "Hegel as the National Philosopher of Germany."

Rose No'ble, or Gold Pen'ny, ancient English gold coin, first current in the reign of Edward III, and last coined under Henry V. It bore a rose on one side, and was worth 1 noble—6*s.* 8*d.* sterling.

Rose of Shar'on. See HIBISCUS.

Roses, War of the, name given to the civil war, lasting thirty years (1455–85), between the princes of the rival houses of York and Lancaster, each claiming the throne of England by right of descent from Edward III.

Roset'ta, Egyptian town; 40 m. NE. of Alexandria, near the mouth of the W. branch of the Nile, and near Fort St. Julien, where the famous Rosetta stone was found; founded 870 A.D., near the site of the ancient Bolbotinum. Its history is obscure, and the name does not appear in the literature of the Coptic period. Before the opening of the canal that connects Alexandria with the Nile it had some importance as a port for trade, but this has almost entirely disappeared. Its native population is about 17,000, with very little foreign admixture.

Rosetta Stone, large slab of black basalt, now in the British Museum; found 1799 by a French engineer in the trenches of Fort St. Julien, near ROSETTA (*q.v.*), Egypt; measures 3 ft. 9 in. in height, 2 ft. 4½ in. in width, and 11 in. in thickness in its present broken condition. It furnished the key to the translation of Egyptian hieroglyphics. It contains parts of 14 lines of hieroglyphic text, in the upper register, nearly the whole of the original 32 lines of demotic or enchorial writing, and 54 lines (28 of them complete) in uncial Greek letters. The mutilations at the top have destroyed about 14 lines of hieroglyphic text, and the piece lost from the lower right-hand corner has deprived us of the endings of 26 lines of the Greek. Judging by internal evidence it has been concluded that the original text was the Greek, and that the native writing contains only versions.

The stone contains a copy of a decree promulgated by the Egyptian priesthood assembled at Memphis, 195 B.C., in honor of Ptolemy V. Epiphanes (205–182 B.C.) on account of certain benefits that he had conferred on Egypt in his eighth year, by remitting certain taxes and reducing others, by conferring privileges on the priests and soldiers, by dedicating certain revenues to the temples, and by averting serious damage from the land by damming the waters of an unusually high Nile. According to the decree it was directed that its text be engraved in three sorts of characters on hard stone, and set up in all Egyptian temples of the first, second, and third order, to commemorate these beneficent deeds of "Ptolemy, the savior of Egypt." It was also directed that statues of the king should be placed in all the temples, and that a shrine containing his image in wood should be carried with those of other deified kings of Egypt in processions.

Rose'wood, name under which several costly kinds of ornamental wood are found in commerce. Usually they are of a deep rose color, veined and clouded with dark purple, which on exposure becomes nearly black, and have the odor of roses, which is especially manifested when the wood is worked. The best-known rosewoods are from Brazil and other parts of S. America, and are of different species of *Dalbergia* and *machærium,* leguminous trees.

Rosicru'cians, secret society first known in the seventeenth century. In "Chymische Hochzeit Christiani Rosenkreuz" (1816) there is a story of a certain Christian Rosenkreuz, a German noble of the fourteenth century, who, after spending a large portion of his life in the E., established in Germany a secret society, which held meetings once a year to admit new members, and to deliberate on secret matters. Whether such a fraternity ever existed is an open question; but the impression that it existed gave rise to associations that spread over Europe, and the term Rosicrucian came to be

applied to all kinds of occult skill. Some theologians considered the society a means of salvation, others the organ of a foul scheme. Some physicians thought that it would give the fulfillment of the golden prophecies of Theophrastus Paracelsus concerning an elixir of life; others that it was only an impudent opposition to Galen. The alchemists particularly were anxious to join it, sure that it had found the philosopher's stone and could make gold, but the whereabouts of the brotherhood remained unknown. For several years the secret society of the Rosicrucians was the all-absorbing topic of the day.

Ros'in, or Col'ophony, residue obtained by distilling off the water and volatile oil from the crude turpentine from pine trees. The yield is from seventy to ninety per cent of the whole. It is largely made, together with oil of turpentine, at Wilmington, Newbern, and Beaufort, N. C. Colophony is pale yellow and transparent (virgin rosin), or brownish-yellow and translucent, according to the care taken in its preparation. It may be obtained, nearly colorless by distillation with steam or some inert gas, under a pressure of ten atmospheres at a temperature not higher than 600° F. It has a peculiar luster, called resinous, is brittle when cold, and breaks with a conchoidal fracture; sp. gr. 1.07 to 1.08. It is insoluble in water, soluble in alcohol, ether, wood spirit, and in fixed and volatile oils; partially soluble in petroleum. Nitric acid dissolves it. It dissolves in caustic alkalies and alkaline carbonates. Colophony is extensively used in making varnishes and cements, in the calking of ships, in the preparation of plasters and ointments, and as a reducing agent in the soldering of metals. Large quantities are consumed in the making of yellow soap.

Röskilde (rès'kĭl-dė), town of Seeland, Denmark; on a branch of the Isseflord; 20 m. W. by S. of Copenhagen; was the ancient capital of the kingdom, but ceased to be a royal residence 1443. The cathedral, dating from 1084, contains more than 70 tombs of Danish kings and members of the royal family.

Ross, Alexander, 1699–1784; Scottish poet; b. Kincardine-O'Neil, Aberdeen; engaged in teaching, and was parish schoolmaster at Lochlee, Forfar, from 1732 until his death; wrote verses from childhood, but was sixty-nine years of age when he first appeared as an author by the publication of "Helenore, or the Fortunate Shepherdess, a Pastoral Tale in the Scottish Dialect, to which are added a few Songs by the Author," a poem which in the N. of Scotland has rivaled in popularity the writings of Burns and Allan Ramsay.

Ross, Sir James Clark, 1800–62; English explorer; b. London; nephew of Sir John Ross, an officer under Parry in his four Arctic voyages, 1819–27; accompanied his uncle's second expedition, 1829–33; again visited Baffin Bay to search for missing whale ships, 1836; sailed in the *Erebus* on an Antarctic voyage, with Commander Crozier in the *Terror*, 1834; made an independent discovery of the Antarctic continent, which Commander Wilkes, U. S. navy, had a few months before discovered and traced at a different point, and named it Victoria Land, and returned 1843. In 1848 he made a voyage as far as Barrow Strait, in search of Sir John Franklin. He published "A Voyage of Discovery and Research in the Southern and Antarctic Regions."

Ross, Sir John, 1777–1856; British navigator; b. Inch, Wigton, Scotland; became a lieutenant in the navy, 1805, and, 1818, sailed on an Arctic voyage in the *Isabella*, accompanied by Lieut. Parry in the *Alexander*. He was made captain on his return, and, 1829, made a second voyage to the Arctic regions, in a steamer equipped by Mr. (afterwards Sir Felix) Booth. He was frozen up in the ice for four years, and was rescued August, 1833, after abandoning his ship April, 1832. In 1850 he went in search of Sir John Franklin. He became rear admiral July 8, 1851; published narratives of his voyages and "A Treatise on Navigation by Steam."

Ross, Sir John, 1829– ; British general; b. Stonehouse, England; entered the army 1846; served during the Crimean War, where he won distinction; at action at Cawnpur and capture of Lucknow; commanded Camel Corps at capture of Calpee and in ensuing campaign in central India; also the Bengal troops during operations in the Malay Peninsula, 1875–76; assigned to command a large force of Indian troops sent to the Mediterranean, 1878, when war with Russia was threatened; commanded a division of the Kabul army during the war with Afghanistan, 1878–79, and received the thanks of Parliament and was knighted; commander in chief in Canada, 1888–93; general, 1891; retired, 1896.

Ross, Sir William Charles, 1794–1860; English painter; b. London; gained a prize from the Society of Arts at age of thirteen; became an assistant to Andrew Robertson, miniature painter, 1817; appointed miniature painter to Queen Victoria, 1837; knighted, 1842; patronized by all the court circle; obtained prize of £100 in cartoon competition with his "Angel Raphael Discoursing with Adam."

Rosse, William Parsons (third Earl of), 1800–67; English astronomer; b. York; sat in House of Commons as Lord Oxmantown, 1821–31; succeeded to peerage, 1841; elected a representative peer of Ireland, 1845, and chancellor of the Univ. of Dublin, 1862; studied astronomy and optics, and concentrated his attention on the improvement of the telescope. For several years he was engaged in experiments referring to the construction of fluid lenses; but although he failed in this, he succeeded in constructing a speculum of a reflecting telescope in which the spherical aberration and the absorption of light were reduced to a minimum, at the same time that his process of construction did away with that cracking and warping of the surface of the speculum while cooling after the casting which so often had proved fatal under the old method of operation. In 1842 a telescope was constructed on his plan, 6 ft. in diameter, and mounted at his residence near Parsonstown. After his

death his work with the great telescope was continued by his son.

Rosselli'ni, Bernardo, 1409–64; Italian sculptor and architect; b. Florence; chief works, the mausoleum of Beata Villana, in Santa Maria Novella, and the monument of Leonardo Bruni (called Aretino) in Santa Croce, which is very remarkable both in design and in perfection of execution. In Rome he restored the churches of Santa Maria in Trastevere, Santa Prassede, San Teodoro, San Pietro in Vincola, San Giovanni Laterano, Santa Maria Maggiore, San Stefano, and San Lorenzo; was also employed at Spoleto, Gualdo, Assisi, Civita Vecchia, Narni, Orvieto, Viterbo, and at Pistoia, where the monument to Filippo Lazzari in the Church of San Domenica may be regarded as one of his principal works.

Rossellini (rō-zĕl-lē'nē), **Ippolito,** 1800–43; Italian Egyptologist; b. Pisa; professor of Oriental languages there; became a disciple of Champollion; at head of a Tuscan commission joined him in exploring the monuments of Egypt, 1827; after Champollion's death prepared the account of their labors in "The Monuments of Egypt and Nubia Explained and Illustrated" (9 vols., with 3 vols. of plates, 1832–43).

Rosset'ti, Christina Georgina, 1830–94; English poet; b. London; sister of Dante Gabriel Rossetti; works include "The Prince's Progress," "The Goblin Market, and other Poems," "Speaking Likenesses," "A Pageant, and other Poems," "Letter and Spirit." Her sister, MARIA, 1827–76, published an admirable study of Dante.

Rossetti, Dante Gabriel, 1828–82; English painter and poet; b. London; son of Gabriele Rossetti; exhibited "The Girlhood of Mary, Virgin," 1848; in same year formed the Preraphaelite brotherhood; became its most distinguished member; aided greatly in the revival of Gothic art in England; painted "Fair Rosamond," "Ecce Ancilla Domini," "Beatrice Dead," and other pictures; author of "Early Italian Poets," "Dante at Verona, and other Poems," "Ballads and Sonnets," etc.; with his brother William edited Gilchrist's "William Blake."

Ros'si, Ernesto, 1829–96; Italian actor; b. Leghorn; began to study law, but joined, 1846, one of the better Italian troupe of actors; played at Milan 1847, Turin 1852, Paris, with Ristori, 1855, subsequently at Vienna; returned to Paris, 1866; appeared in the "Cid" at the Théâtre Français on the anniversary of the birthday of Corneille; performed several of the principal characters of Shakespeare—*Hamlet, Othello,* etc.—in Lisbon, 1869; aroused much admiration by his performances, 1874; in Breslau, Berlin, Dresden, and Prague; achieved great success in S. America; visited the U. S., 1881.

Rossi, Giovanni Battista de', 1822–94; Italian archæologist; b. Rome; under Father Marchi devoted himself to study of archæology and the Christian inscriptions of the first centuries of the Church; made member of the Berlin Academy of Sciences and also foreign member of the French Institute; discoveries by him in the catacombs are of special importance, particularly those in the cemetery of St. Calixtus; most valuable works, "Inscriptiones Christianæ Urbis Romæ septimo sæculo antiquiores" and "Roma Sotterranea Cristiana"; was a chief editor of the "Inscriptiones urbis Romæ" (vol. vi of the "Corpus Inscriptorum Latinorum").

Rossini (rōs-sē'nē), **Gioacchino Antonio,** 1792–1868; Italian composer; b. Pesaro; 1807, entered the musical school of Bologna, studying counterpoint under the Abbate Mattei, and, 1810, produced his first opera, "La Cambiale di Matrimonio," at Venice. Other operas, since forgotten, followed, and, 1813, his "Tancredi" excited immense enthusiasm, first in Venice, and soon on every stage on which Italian opera was given. In 1815 he went to Naples as director of the opera, and composed among other operas "Elizabetta," "Otello," "La Gazza Ladra," "Mosè in Egitto," "La Donna del Lago," and "Zelmira"; but his most celebrated production of this period is "Il Barbiere di Seviglia," first performed in Rome, 1816, and generally considered the masterpiece of the whole genre of opera buffa. In 1847 he removed to Florence, 1856 to Paris, where he died. In the last forty years of his life he published only a "Stabat Mater" and a "Messe solennelle," which was performed at his burial.

Rostand (rōs-tăn'), **Edmond,** 1868– ; French dramatist; b. Marseilles; "Les Romanesques," "La Princesse Lointaine," and "La Samaritaine," while showing great promise, were not great successes, but "Cyrano de Bergerac" at once brought him into popular favor. His "L'Aiglon" was equally well received.

Rostoptchin', Fedor Wasilievich (Count), 1763–1826; Russian general; b. government of Orel; educated at court as a page of Catharine II; became Minister of Foreign Affairs under Paul I; was Governor General of Moscow, 1812, when Napoleon approached. He was long believed throughout W. Europe to have set fire to the city before leaving it to the French, but in his "La Verité sur l'Incendie de Moscou" (Paris, 1823) he denies this. It is certain, however, that he set fire to his own palace and made preparations for the burning of the magazines.

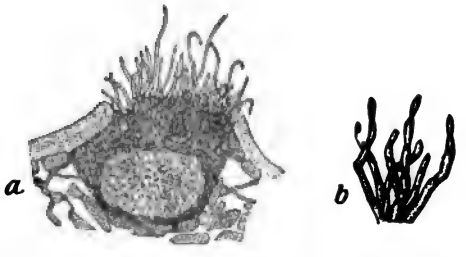
Rostov', town of European Russia, government of Ekaterinoslaf; on the Don, at the beginning of its delta; founded, 1749, as a fortress, and rapidly growing into one of the commercial centers of S. Russia; ropes, linen, leather, soap, and tobacco are extensively manufactured. Pop. (1900) 119,476.

Ros'trum, the beak of a ship-of-war; made of bronze or iron, and intended to act against the timbers of an enemy's vessel, like the battering-ram against a wall. In early warfare it consisted of a single beam, shod at the end with a metal head, generally representing some animal. It projected from the head of the

vessel at a certain elevation above the keel and water's edge; sometimes it had also several projecting beams, cased with sharp metal points, situated on a level with the keel or depressed below it, so that every fracture not only damaged the enemy's vessel, but made a hole below the water.

Rostra, the plural of the word, was the name given to the tribune in the Roman forum from which public men addressed the people, because it was ornamented with the beaks of ships taken from the Antiates in the Latin war. It was originally situated between the comitia and the forum; used also as a place for setting up statues of distinguished men; on its sides were displayed some of the most important public documents, such as laws, international treaties, etc. At Cæsar's initiative the old rostra was torn down, and a new one constructed (probably not earlier than 42 B.C.) at the W. end of the forum, before the Temple of Concord. This was about 10 ft. high, 80 ft. long, and 33 ft. deep, its great size being accounted for by the necessity of providing a place for statues, as above indicated. The rostra was restored with great magnificence in the second century A.D. (by Trajan or Hadrian). See BEAK.

Rot, diseases of plants, due to the attacks of fungi or similar organisms. The *bitter rot* of apples causes on the surface of the mature fruit brownish or blackish spots, which at length become studded with minute black raised points. On cutting through a diseased spot it is seen to extend far into the tissues. The attacking fungus is *Glœosporium fructigenum*. Spraying the fruit in August with a



ROT. *a*, section through black point of bitter rot; *b*, spore-bearing threads (highly magnified).

one-per-cent solution of ammoniacal copper carbonate is a preventive. Another rot of the apple is called *black rot*, from the black color of the decayed portion.

Black rot of grapes attacks the fruit, leaves, and shoots, causing brown and finally black spots of dead tissue, resulting eventually in the shriveling of the berries. The disease is caused by a black fungus (*Læstadia bidwellii*).

The *brown rot* of grapes is caused by one of the downy mildews (*Plasmopara viticola*). The grapes turn brown and hard, and finally shrivel up. Both kinds of rot on grapes may be prevented by spraying the vines five or six times during the season with a one-per-cent solution of ammoniacal copper carbonate. The *bitter rot* of the grape which gives to the fruit a bitter taste is due to a minute species of the "imperfect fungi." Closely related to this is the *white rot*. No remedy is known for either, but Bordeaux mixture is recommended.

One form of *potato rot* or *blight* is caused by a downy mildew (*Phytophthora infestans*) whose parasitic threads penetrate the tissues and destroy them. Another form of potato rot is produced by bacteria, which infest the tissues of the tubers, causing their speedy decay. *Plum rot* is a common disease of the nearly ripe fruits of plum and peach trees, caused by an imperfect fungus (*Monilia fructigena*). The speedy removal of all diseased fruit and the early application of poisonous sprays will check the disease. *Tomato rot*, in which the fruit decays when nearly ripe, is due to the minute *Macrosporium tomato*, one of the "imperfect fungi." Growing the plants so as to admit light and air decreases this disease, and spraying with Bordeaux mixture has been recommended.

Root rot is an affection of several cultivated plants, and appears to be due to the growth of some of the larger fungi. In the grape the mycelium of one of the toadstools (*Armillaria mellea*) penetrates and destroys the tissues of the roots, finally producing the characteristic fruiting. *Dry rot* of timber is a destruction of the tissues of the wood, resulting from the growth of the mycelium of one of the pore fungi, *Merulius lacrymans*. It attacks timber which is kept damp, as the supports in mines, cellars, etc., the foundation timbers of buildings, and, in wooden ships, the interior timbers below the water line. Thorough painting or saturation with poisonous solutions reduces the danger of dry rot. Especial care should be taken to avoid the use of timber in which dry rot has begun. *Wet rot* of timber trees is caused apparently by larger fungi. See BLIGHT.

Rota'tion of Crops, the practice of cultivating an orderly succession of different crops on the same land. Different crops are all made up of the same elements, and take up food from the soil; but they do not all take up soil food of the same amount or in the same form. Thus the potato, tobacco, and fruit trees require a great deal of potash; the grain crops take up more phosphates. The crops differ in their feeding just as animals differ. If cattle and sheep are pastured together, the sheep will pick out certain weeds and grasses, and the cattle may prefer others. Wheat, for instance, requires nitrates as one of its most important foods, and if wheat is grown year after year it may soon exhaust the nitrates available; but if wheat is grown one year and some other crop the next, the second crop may be able to feed well and flourish upon food left by the wheat.

The plants have different methods or powers of getting the same kind of food. Thus clover or peas will get nitrogen by means of the little knots or tubercles upon their roots, whereas wheat has not this power to take up free nitrogen. A clover crop will need more nitrogen than a crop of wheat, and yet, because of the root tubercles, nitrates are not applied to a

clover crop, but nitrates may be applied to wheat with good results. The plants have different kinds of roots. Those of barley are very short, those of wheat longer, those of red clover and lucerne still longer. A deep-rooted crop feeds lower down than a shallow-rooted crop. If, then, clover is grown this year and wheat the next, these crops grow, to a great extent, in two different soils. The surface soil is used for one and under soil or subsoil for the other. By changing from a shallow-rooting crop to a deep-rooting, or from a deep-rooting to a shallow-rooting, the soil is changed, as it were, from year to year. This is one of the most important points to observe in rotating crops.

By rotating crops the treatment of the same soil is changed, since the soil is not treated exactly alike in preparing it for different crops. Some crops, also, are cultivated, and others are not. Thus the weeds are given different treatment. The weeds differ as do the crops; there are annuals, biennials, and perennials; there are long-rooted and shallow-rooted; there are early seeding and late-seeding weeds. The same treatment year after year may be just the right treatment to encourage certain weeds to grow and spread. The growing of wheat year after year in the W. is causing the spread of some very noxious weeds. By changing the crops, and therefore the treatment of the soil, the weeds are not given so good a chance to rob the crops and infest the fields. The insects also make their homes on certain crops and in the ground. By rotating the crops the insects are disturbed, and this helps to keep them in check. If the food of the insects is removed, and their eggs are buried deep in the soil, or turned up to the frost, this helps to destroy them. Some crops mature early in the year, as fall wheat and barley; others late in the fall, as corn and roots. Some are in the ground but a short time, others for a long time, and so they have different lengths of time for feeding. It is often helpful to have a long-feeding crop followed by a short-feeding crop.

Rotato'ria. See ROTIFERA.

Rothe (rō'tĕ), **Richard,** 1799–1867; German theologian; b. Posen, Prussia; appointed preacher to the Prussian embassy at Rome, 1823; professor at Wittenberg, 1828; Heidelberg, 1837; Bonn, 1849; and again at Heidelberg, 1854; principal work, "Theological Ethics"; also occupied a prominent place in the historical and dogmatic divisions of his science —"The Beginnings of the Christian Church" and "Dogmatics."

Rothesay (rōth'sā), royal burgh and favorite watering place of Scotland; capital of Bute Co.; at the head of a spacious and sheltered bay on the NE. coast of island of Bute. Though the first cotton mill established in Scotland was located here, the place has now no industries worth mentioning. Considerable fishing, however, is carried on. Near the center of the town are the ruins of Rothesay Castle, founded 1098.

Rothesay, David Stewart (Duke of). See STEWART.

Rothschild (rōt'shĭlt), **Mayer Anselm,** 1743–1812; financier and founder of a family celebrated for its great wealth; b. Frankfort-on-the-Main; intended for the Jewish priesthood, but was placed in a counting house at Hanover, whence he returned to Frankfort and started in business for himself as a banker and broker. Devoting himself closely to his business, he obtained a reputation for ability and integrity, and was intrusted with the money affairs of the landgrave, afterwards Elector of Hesse, who during Napoleon's possession of Germany confided to Rothschild the keeping of his immense private fortune without interest. At his death he left a large fortune to his five sons, Anselm, Solomon, Nathan, Charles, and James, who established themselves respectively in Frankfort, Vienna, London, Naples, and Paris. All of these were created, 1822, barons of the Austrian Empire. The third son, NATHAN (1777–1836), who established a branch of the house in England, employed with great judgment the immense sums confided to his father, and raised the firm to the position of one of the leading banking houses of the world. LIONEL NATHAN (1808–79), eldest son of Nathan, was repeatedly elected to the British Parliament, but declining to take the prescribed oath, "on the true faith of a Christian," was not admitted until the act for removing the disabilities of the Jews was passed, 1858, when he took his seat, being the first Jew admitted to Parliament. Later members of English family: NATHAN MAYER, first Baron de Rothschild (created 1885), b. London, 1840, son of Baron Lionel Nathan, succeeded uncle in baronetcy, 1876, and father as Austrian baron, 1879; member of Parliament, 1865–85; ALFRED CHARLES, b. London, 1842, son of Baron Lionel, became Austro-Hungarian consul general, and director of Bank of England; LIONEL WALTER, b. London, 1868, author of numerous works on zoölogy. The English, French, and German families generally intermarried.

Rotif'era, group of microscopic animals of interest from the fact that they represent as adults a structure which occurs only in the embryos of other worms. The scientific name, as well as the popular term of wheel animalcules, is due to the fact that around the anterior end of the body is a more or less modified circle of cilia, the motions of which convey the impression of a wheel in rapid rotation. Rotifers have no organs of circulation or respiration. Most of the rotifers live in fresh water, and are noticeable because they are able to withstand prolonged drying, and on the return of moisture again begin their active life.

ROTIFER.

Rot'teck, Karl Wenzeslaus Rodecker von, 1775–1840; German historian; b. Freiburg, Baden; appointed Prof. of History at Freiburg Univ.; took part in the opposition against the political reaction

which set in after 1815; elected to the upper chamber of Baden, 1819; to the lower, 1831; was one of the foremost in the liberal opposition; incurred the hostility of the government, and was deprived of his professorship, 1832. By his "Universal History" (nine volumes, 1813–27) he exercised a great and beneficial influence on the German middle classes. The work was often reprinted, and translated into several European languages.

Rot'terdam, city of S. Holland, Netherlands; on the Maas; 14 m. from the N. Sea; 36 m. SW. of Amsterdam; chief port and second city in population of the kingdom; is intersected by numerous canals, and traversed by the Rotte, a small stream, at the junction of which with the Maas is a large dike or dam; whence the name Rotterdam. The numerous vessels lying in the canals and harbors, which are deep enough to accommodate those of heavy tonnage and admit of their discharging their cargoes in the very heart of the city, always present a busy and picturesque scene. Here is the birthplace of Erasmus (*q.v.*), to whom a bronze statue is erected. Rotterdam is the entrepôt of a large cattle trade with England, and the point of departure of numerous lines of steamships, and, besides being the seat of an extensive commerce with the E. Indian possessions of Holland and with Europe and America, has important manufactures. Pop. (1907) 403,356.

Roubaix (rō-bā'), town of Nord, France; on canal of same name; 6 m. N. of Lille; noted as a principal seat of the French textile industry, manufacturing immense quantities of cotton, woolen, and silk goods, besides flax, furniture cloth, carpets, and twists; has also dyeworks, breweries, and tanneries; chief buildings, École Nationale des Arts Industriels, Hôtel de Ville, and Church of St. Martin. Pop. (1906) 121,017.

Roubiliac (rō-bē-lē-ăk'), **Louis François**, abt. 1695–1762; English sculptor; b. Lyons, France; settled in England probably during the reign of George I; executed many important works, among which were the celebrated monuments of Mrs. Nightingale, that of John, Duke of Argyle, and the statue of Handel, all in Westminster Abbey; the statue of Shakespeare in the British Museum, and of Sir Isaac Newton at Cambridge.

Rou'ble. See RUBLE.

Rouen (rō-ăn'), ancient *Rotomagi*, city of France, former capital of Normandy; present capital of department of Seine-Inférieure; on the Seine; 67 m. NW. of Paris, and connected with its suburb, St. Sever, on the opposite bank, by three bridges. The quays along the river and the boulevards occupying the site of the former ramparts are new and elegant; the central part is old and more interesting than beautiful. Of many remarkable public buildings the most noticeable are the cathedral, a Gothic structure of great beauty, 434 ft. long, 103 broad, 89 high at the nave, with a tower and spire over the crossing of the nave and the transept rising 470 ft., and two elegant towers flanking the front, built by Philip Augustus (1200–20), and containing, besides a number of other interesting monuments, the tomb of Richard Cœur de Lion; the Church of St. Ouen, built in the fourteenth century, and considered one of the finest specimens of Gothic architecture; the Palais de Justice, of the fifteenth century, etc. In the Place de la Pucelle stands a statue of the Maid of Orleans, who was burned here, 1431. Monuments have also been raised in honor of Corneille and Boïeldieu, born here. The city has a public library, valuable collection of pictures, excellent botanical garden, theological seminary, academy of science and art, and numerous other educational and benevolent institutions. The principal manufactured articles are cotton and cotton velvet, mixed silk and woolen fabrics, flannels, blankets, and hosiery, chemicals, paper, etc. Its commerce is very extensive; the river forms an excellent harbor, and vessels of 400 to 500 tons can enter it. Pop. (1906) 118,459.

Rouge (rōzh), (1) pink cosmetic for the cheeks. Varieties are prepared from carmine and from the dried leaves of the safflower or carthamus. The latter furnish the delicate sort known as vegetable rouge. (2) A pigment known as English red, also used as a polishing powder, made with peroxide of iron. The perfection of the specula of telescopes depends on the fineness and efficiency of the rouge used for polishing them.

Rouge et Noir (ā nwăr), French, "red and black," **Trente et un** (trăńt ā ŭń), "31," or **Trente et Quarante** (kā-răńt'), "30 and 40," game of chance played with six packs of cards on a table, each end of which is divided alike into spaces known as *rouge*, *noir*, *couleur*, and *inverse*. The players make even bets with the bank by placing the sums risked on these spaces. The *tailleur* (dealer or banker) deals first for *noir*, and places the cards in a row until the number of pips amounts to more than 30, the face cards counting 10 each. He then deals for *rouge* in the same manner, and that row whose value is nearest to 31 wins. If the first card dealt is of the color whose row wins, *couleur* wins; if it be of the color of the losing row, *inverse* wins. If the value of the two rows is equal, it is a *refait*, a new dealing commences, and the players neither win nor lose unless the value of each row is 31; in that case the players lose half the stakes. Were it not for this provision as regards the refait of 31 (which occurs once in about 64 times), the chances of the players and the bank would be equal. In 1789 this game and roulette were invented in Paris, and superseded faro and biribi, but both were forbidden by law, 1838. In 1873 they were also forbidden in Germany, but they are still popular at Monaco.

Rouget (rō-zhā'), **Georges**, 1781–1869; French painter; b. Paris; began to exhibit, 1812; achieved great success both by his portraits and historical pictures; best-known works: the "Marriage of Napoleon and Marie Louise," at Versailles; the "Death of Napoleon," and portraits of Napoleon, Marshal Soult, Louis XVIII, and Charles X.

Rouget de Lisle (dė lēl'), **Claude Joseph,** 1760–1836; author of words and music of the "Marseillaise"; b. Lons-le-Saulnier; was an officer of engineers at Strassburg when he composed the "Marseillaise" in the night of April 25, 1792; served afterwards in La Vendée, retired to civil life, and was pensioned by Louis Philippe, 1830; wrote other poems, stories, libretti for operas, etc.

Rough Rid'ers, popular name of members of the First and Second Regiments of U. S. Volunteer Cavalry, organized for service in the Spanish-American War, 1898; more particularly applied to the former body, of which Leonard Wood (later major general, U. S. A.) was colonel, and Theodore Roosevelt (later President U. S.) was lieutenant colonel. These regiments received their popular name because composed largely of ranchmen from the W., the First Regiment having representatives from Arizona, Indian Territory, New Mexico, Oklahoma, and several E. cities and colleges.

Rouher (rō-ār'), **Eugène,** 1814–84; French politician; b. Riom; elected, 1848, to the Constituent, and, 1849, to the Legislative Assembly; three times Minister of Justice, 1849–52; afterwards Vice President of the Council, Minister of Agriculture, Commerce, and Public Works; Senator, President of the Council (1863–67); Premier with the Portfolio of the Finances till July 13, 1869, and later President of the Senate. He was identified with all the foreign and internal affairs which proved fatal to the second empire. After its downfall (September 4, 1870) he fled; yet was elected to the National Assembly, 1872, and the Chamber of Deputies, 1876.

Roulette (rō-lėt'), French, "a little wheel," game of chance, played on a cloth-covered oblong table, in the center of which is a round cavity having several copper bands around its sides at equal distances from each other. The sides are fixed, but the bottom is movable round an axis in the center of the cavity, and around its circumference are 38 holes painted black and red alternately, and numbered from 1 to 36, with two zeros (painted green) marked 0 and 00. These numbers and zeros are painted on the cloth, and on the margin of the table are the words *impair, manque, rouge, pair, passe,* and *noir.* The manager turns the wheel, at the same time throwing into the cavity in an opposite direction to the movement given to the movable bottom an ivory ball, which when the revolution ceases falls into one of the numbered cells. The player stakes his money on one or more numbers, and if the ball falls into the corresponding number or zero, he receives for one number his stake and 35 times more, for two numbers 18 times more, for three numbers 12 times more, and so on, the gain being less as the risk is reduced. There are also various other chances connected with the words on the margin.

Rouma'nia, kingdom of Europe, comprising the former principalities of Moldavia and Wallachia, together with the Dobrudja, a territory E. of the Danube, ceded by the Ottoman Empire, 1878; bounded N. by Austria-Hungary and Russia; E. by the Pruth, which separates it from Russia, and by the Black Sea; S. by Bulgaria and the Danube; W. by the Danube, which separates it from Bulgaria and Servia, and by Austria-Hungary; area, 50,720 sq. m.; pop. (1907) estimated at 6,684,256; chief towns: Bucharest (capital), Jassy, Galatz, Braila, Borosani, Ploësti, Craiova, Berlad, Focsani. Surface rises gradually from the Danube and the Pruth to the inland frontier, the crest of the Carpathians, whose loftiest peak, the Ciaclene, or Pion, attains a height of 8,920 ft. Chief rivers besides the Danube: the Pruth (247 m. long), Aluta or Olto (220 m.), Sereth (215 m.), Dumbovitza, on which Bucharest is situated.

Climate varies with situation and elevation; extremes of temperature, 98° F. and 19°; winter passes almost without transition into summer, and autumn suddenly into winter. Mineral products include gold, iron, copper and lead ores, cobalt, arsenic, native sulphur, coal, hydraulic lime, alabaster, various marbles. Salt works and petroleum wells yield valuable returns. Chief agricultural products: maize, wheat, rye, barley, oats, millet, flax, hemp, and tobacco. Soil exceedingly fertile. Live stock is a main source of wealth. Principal manufactures: clothing, articles of wood and of metal, alimentary substances, bricks, pottery, baskets, textiles, leather. Principal articles of export, cereals, textiles, metals, and manufactures, hides, leather, mineral fuel, minerals, pottery, glass, animals and animal products, fruits, chemicals and drugs, wood.

Government an hereditary constitutional monarchy. Constitution guarantees to every Roumanian equality under the law, and liberty of conscience, with freedom of the press and right of assembly. Legislation vested in a senate of 120 members and a house of 183 deputies. Person of the king inviolable, but his eight ministers are responsible to the legislative bodies. Pop. includes Roumanians, Israelites, Gypsies, and Slavs. Language probably the descendant of the vulgar Latin of the regions S. of the Danube. Of total pop. some 5,475,000 belong to the Orthodox Greek Church, more than 150,000 are Roman Catholic or Protestant, abt. 270,000 are Jews, and abt. 46,000 Mohammedans. Education free and compulsory, but still in a backward condition.

The Kingdom of Roumania had its real beginning in the emergence of the two principalities of Wallachia (1241) and Moldavia (1293) emerged from the general confusion caused by the invasion of the Goths. They long and fiercely resisted the Ottomans, but were forced to become vassal provinces. From 1511 to 1849 their hospodars, or governors, were chosen by the sultan. These rulers were usually Phanariote Greeks, but, 1822, natives began to be appointed. Constant interference of Russia in their behalf and remoteness from Constantinople assured Moldavia and Wallachia privileges which they could not otherwise have enjoyed. During the Crimean War they were occupied by Austrian troops. In 1858 a European convention for their reorganization was signed at Paris. In 1859 both Moldavia and Wallachia elected Prince Cuza hospodar, and declared

themselves united, 1861. The despotic Cuza was compelled to abdicate, 1866, and Prince Charles of Hohenzollern called to the throne. A constitution was speedily promulgated. The Roumanians distinguished themselves in the Russo-Turkish War (1877–78), and largely contributed to the capture of Plevna. Their independence was recognized by the Congress of Berlin, 1878, and the country proclaimed itself a kingdom, March 26, 1881. King Charles having no children, his nephew, Prince Ferdinand, was decreed heir presumptive, March 18, 1889. Roumania entered the World War on the side of the Allies, and between Aug. 27, 1916, and Jan. 15, 1917, was practically crushed, Bucharest, the capital being occupied by the Germans, Dec. 6. 1916; the Dobrudja was conquered, Jan. 2, 1917, and Focsani was captured, Jan. 8, following.

Roume'lia, Rou'meli, or **Roum,** name formerly applied by the Ottomans to their European provinces in distinction from those in Asia, which were called Anatolia or Anadoli. The Ottoman sultan is still called by the Tartars Sultan of Roum, by which, however, they often mean Asia Minor. In a restricted sense, Roumelia is supposed to comprise ancient Thracia and parts of Illyricum, Epirus, and Macedonia. The province of E. Roumelia, or S. Bulgaria, as it is also called, created by the Congress of Berlin (1878), and comprising territory S. of the Balkans; mainly inhabited by Bulgarians, united itself to the principality of Bulgaria (Oct., 1885). In the following year, the Sultan agreed that the government of E. Roumelia should be confided to the (then) Prince of Bulgaria as governor-general.

Round'heads, Puritans or supporters of Parliament during the civil war in England, so styled probably from having the hair cut close, while the Cavaliers, or adherents of the king, wore theirs long.

Round Rob'in, name given to a protest or remonstrance signed by a number of persons in a circular form, so that no one shall be obliged to head the list. It is said to have originated in a usage of the French officers. The most memorable round robin in literary history is that sent by Burke, Gibbon, Sir Joshua Reynolds, Joseph Warton, and others to Dr. Johnson, requesting him to amend the epitaph for Goldsmith's monument, and suggesting that it should be written in English, not Latin. Johnson took it kindly, but told Sir Joshua, who carried it to him, that he would "never consent to disgrace the walls of Westminster Abbey with an English inscription."

Round Ta'ble. See ARTHUR; ROMANCES.

Round Tow'ers, remarkable stone towers found chiefly in Ireland, but also in Scotland, Switzerland, Corsica, and other countries. It has been customary to assign these structures to the pagan and even the prehistoric period; another opinion is that they were attached to churches and other ecclesiastical buildings of a very remote period.

Rousseau (rô-sô'), **Jean Baptiste,** 1670–1741; French poet; b. Paris; son of a shoemaker; won from his contemporaries the title of "prince of lyric poets" by his odes, epistles, allegories, cantatas, and epigrams. He was suspected of the authorship of verses against persons of consideration, tried to free himself and fasten the authorship on the geometrician Saurin by bribed witnesses, and was condemned, 1712, to perpetual banishment.

Rousseau, Jean Jacques, 1712–78; French author; b. Geneva; descended from Protestant refugees; nominally embraced Catholicism; attempted to gain a living at various pursuits, but frequently relapsed into vagabondism, and was dismissed from a seminary as unfitted for the priesthood. After this he lived with Mme. de Warens at Chambéry, and for several years as her lover at her neighboring farmhouse, Les Charmettes, but left her, 1740, in a fit of jealousy. Relying on his musical talents, he went to Paris, 1741, and remained there for a long period, excepting while attached (1744–45) to the French embassy at Venice. He became acquainted with Mme. d'Épinay, Diderot, Grimm, and D'Holbach, and, 1750, received the prize from the Academy of Dijon for his essay on the question whether the progress of science and the arts has contributed to corrupt or improve the morals of mankind. In this he declared war against all civilization, and henceforward he set himself up as a censor and reformer of society, disdaining all the elegancies of life, and attracting attention by his oddities. In 1752 he produced "The Soothsayer of the Village," an opera, the artless melody of which won general admiration, and "Letter on French Music," in favor of Italian music. He caused a still greater sensation, 1753, by attacking, in his "Discourse on the Origin of Inequality among Men," the existing social order. In 1756 he removed with his mistress, Thérèse Le Vasseur (originally a cook, and ultimately his wife), to the Hermitage, a charming retreat assigned to him by Mme. d'Épinay in the valley of Montmorency. Here he wrote most of "Julie, or the New Héloïse" (six volumes, 1760). His love for Mme. d'Houdetot gave umbrage to Mme. d'Epinay, while he became jealous of her relations with Grimm, Diderot, and D'Holbach. He was finally obliged to retire to Montmorency, where he found friends in the Duke and Duchess de Luxembourg. While residing in one of the duke's chateaux he wrote "The Social Contract," in which he proclaimed the principles of universal suffrage and popular sovereignty, and "Émile, or on Education," which has been called by Goethe "nature's gospel on education." This was printed in Amsterdam at the duke's expense; and, being also published in Paris against Rousseau's wishes, it was condemned by the Parliament, when he fled from France. Driven from Geneva and the canton of Bern, he took refuge in Neuchâtel, protected by Lord Keith, the Prussian governor; but the latter's departure left him at the mercy of fanatics, and, 1766, he accompanied David Hume to England, but soon fell out with him. He returned to France, 1767, and to Paris, 1770. His health was utterly broken by his fears of his enemies; and the police having interdicted the readings of his "Confessions" at the house of Mme. d'Épinay, he became still

more despondent. Early, 1778, he went with M. de Girardin to Ermenonville, where he died suddenly, probably from apoplexy. In 1794 his remains were removed to the Panthéon. No writer has been more bitterly denounced than Rousseau, but his style is unrivaled in French literature, and his peculiar theories paved the way for mighty reforms and revolutions.

Rove Bee'tles, beetles of the family *Staphylinidæ*, in which the wing covers are very short, leaving a large part of the abdomen uncovered. The beetle when irritated turns this abdomen about in such a way as to convey the impression that it is armed with a sting. The rove beetles are small, frequently minute; they live under stones, in moss, on composite flowers, etc.

Rovi'go, Duke of. See SAVARY.

Rowan (rō'ăn), **Stephen Clegg**, 1808–90; American naval officer; b. near Dublin, Ireland; entered the navy, 1826; distinguished for ability and courage on the W. coast of Mexico during the war with that country, and during the Civil War in the rivers of Virginia, the sounds of N. Carolina, and at Charleston, S. C.; for long and gallant service received vote of thanks from Congress; made vice admiral, 1870; became superintendent Naval Observatory, and chairman of Lighthouse Board; retired, 1889.

Rowan Tree. See MOUNTAIN ASH.

Rowe (rō), **Nicholas**, 1674–1718; English dramatist; b. Little Barford; studied law; became a successful courtier and politician; best known as a dramatic author; published an edition of Shakespeare (1709), preceded by the first biography of that poet; became Under Secretary of State under Queen Anne (1708–11); made poet laureate by George I; buried in Westminster Abbey; most successful plays, the tragedies, "Tamerlane," "The Fair Penitent," "Jane Shore," "Lady Jane Grey."

Row'ing is the art of propelling a boat by means of oars, which act as levers of the second order, the work being done between the power (*i.e.*, the rower) and the fulcrum (*i.e.*, the water, of which the actual displacement is very slight). That part of the operation during which the power is actually being applied, *i.e.*, when the oar is in the water, is specifically called the stroke, while feathering is the act of turning the blade of the oar so as to be parallel to the surface of the water, and carrying it thus through the air into position to repeat the stroke. Much skill is required to perform these operations satisfactorily; and, in fact, rowing can be learned only from observation and practice. Technically the word "rowing" is used by boating men only when each oarsman has but a single oar; when he has one in each hand he is said to "scull," and the oars are called "sculls." Although rowing is certainly one of the most ancient methods of propelling vessels, it has only comparatively recently come into prominence as a form of sport.

Boat racing practically dates from the first quarter of the nineteenth century, and its development has lain almost entirely in the hands of the Anglo-Saxon races. The Thames in England has always been the leading resort of amateur oarsmanship, which had attained some little vigor before the first boat race between Oxford and Cambridge universities took place in 1829. The second took place in 1836, and since 1856 the contest has been annual, the course (since 1864) being from Putney to Mortlake, about 4½ m. Of the very numerous amateur regattas which are held all over Great Britain, the chief is that at Henley-on-Thames, held annually since 1839. In Great Britain rowing affairs for amateurs are now generally conducted under the rules of the Amateur Rowing Association, founded in 1879, and recognized by all the chief clubs.

In the U. S. the first amateur rowing club was founded in 1834, but the sport did not make much progress until the universities of Yale (in 1843) and Harvard (in 1844) took it up. The first intercollegiate race was held at Center Harbor, on Lake Winnipiseogee, August 3, 1852. Harvard was represented by the *Oneida*, while Yale was present with two boats, the *Shawmut* and *Undine*. The *Oneida* won. In 1853 Harvard suggested a convention of colleges with boat clubs, which met at New Haven, May 26th, with Harvard, Yale, Brown, and Trinity represented by delegates. Arrangements were set on foot for a regatta under rulings adopted by the convention. On July 26th of the following year the first intercollegiate regatta was held on Lake Quinsigamond with Harvard, Yale, and Brown represented. Harvard entered two boats and Yale and Brown one each. Harvard won in 19:11½, the distance being 1½ m. to stake and back to place of starting. In 1871 the Rowing Association of American Colleges was formed by Harvard, Brown, Massachusetts Agricultural, and various other colleges with aquatic facilities. The next year Yale and Cornell entered the association, which then represented eleven colleges. The regatta of 1873 was held over the course at Saratoga, and eleven crews entered. Yale won. In 1876 the Yale-Harvard races were again established for eight-oared shells with coxswains over a four-mile straight-away course at Springfield, on the Connecticut. Yale won by 21 sec. in 22:02. Since 1876 the Yale-Harvard race has been an annual occurrence. All but the first two of these latter races have been rowed on the Thames at New London, Conn. Rowing at Cornell dates from 1869 with the formation of the Undine Boat Club. In 1870 the Cornell navy was organized, and has existed as such ever since. In 1873 Cornell sent her first crew to compete with other colleges in the regatta of the American Colleges Rowing Association, and was annually represented in this contest thereafter till the association came to an end. Since 1895 the intercollegiate races have been held on the Hudson at Poughkeepsie, Cornell having won the majority of the races.

Holland, Germany, and other countries have rowing clubs of importance; and foreign oarsmen have competed from time to time at British regattas, without, however, great success. The oldest established boat race in England is that for Doggett's coat and badge, founded by Doggett, the comedian, in 1715, and still competed for on the Thames by young watermen.

But races for "championships" among professional oarsmen really began on the Thames in 1831, and are practically restricted to sculling races. Racing boats are called eight oared, or "eights," "fours," "pairs," etc., according to the number of rowers. "Sixes" and "double scullers" are commoner in America than in Great Britain. The use of outriggers was introduced abt. 1844; that of sliding seats, an American invention, abt. 1871.

Roy, William, 1726–90; British surveyor; b. Scotland; was a general; 1783–88 made a trigonometrical survey from Greenwich to Dover, the first in Great Britain; wrote "The Military Antiquities of the Romans in North Britain."

Roxa'na, beautiful daughter of the Bactrian prince, Oxyartes; became the wife of Alexander the Great, 327 B.C., and shortly after the death of Alexander, 323 B.C., bore a son, Alexander IV. She and her son were murdered by Cassander, 311 B.C.

Roy'al Acad'emy. See ACADEMY.

Royal Geograph'ical Soci'ety, institution founded by royal charter in London, 1830, for the promotion and encouragement of geographical research; annually awards several medals to successful workers in the cause of geography, and distributes prizes among training colleges for proficiency in geographical knowledge. The society's "Journal" reports the progress of explorations and discoveries.

Royer-Collard (rwä-yā'-kŏ-lär'), **Pierre Paul,** 1763–1845; French statesman; b. Sompuis, Marne; was proscribed as a moderate, 1792; elected to the Council of 500, 1797; member Chamber of Deputies under the Restoration and Louis Philippe; was a liberal royalist, and the founder of the party of doctrinaires. From 1811–14 he was Prof. of the History of Philosophy in the Sorbonne; was the master of Cousin and Jouffroy in speculative philosophy, and of Guizot and De Tocqueville in political science, but left no permanent record corresponding to his personal reputation and authority.

Ruatan', or **Roatan,** island in Caribbean Sea, 30 m. from the N. coast of Honduras, to which it belongs; area about 80 sq. m.; inhabitants engaged in fishing and turtle catching. In 1742 this island was seized by Great Britain, and, 1797, about 5,000 Caribs were transported to it from St. Vincent; most of them since passed over to the mainland. Subsequently Great Britain gave the island to Honduras, but temporarily held it again, 1841–42.

Rubasse', variety of crystallized quartz, discolored and stained with specks of red and yellow iron oxide, which give it a fine red. Artificial rubasses of all colors are made from rock crystal heated and dipped in cold colored aniline solutions, which cracks the crystal, when the color fills the cracks throughout the mass.

Rub'ber, In'dia Rubber, Gut'ta-per'cha, Caoutchouc (kō'chŏk), or **Gum Elas'tic,** substance composed of carbon and hydrogen, obtained from the juice of many different families of plants. Most of the rubber of commerce comes from S. America, from Parâ, Central America, Mexico, Cartagena, etc.; smaller quantities from Java, Penang, Singapore, Assam, and Natal. The juice is obtained by tapping. When the bleeding is confined to the cold months, and not repeated too often, the trees

URCEOLA ELASTICA.

do not appear to suffer. If the juice be left at rest for a few hours, the globules of the gum rises like cream on milk. The juice is sometimes evaporated by solar heat, a skim of rubber forming on the surface, and being renewed as fast as it is removed until all the rubber is removed. These sheets are combined into masses.

Crude rubber presents different shapes and structure according to the method and care

SIPHONIA ELASTICA.

employed in its preparation. The purest from Parâ is more valuable than that from other localities.

Gutta-percha is the hardened milky juice of a large tree, which exudes from incisions in the bark made after the tree is cut down, and is thickened by boiling. The purified gutta-percha has a brownish-red color, and a specific

gravity of 0.979. It becomes electrical by friction, and is a very poor conductor of electricity; hence it is used for forming insulating supports for electrical apparatus, and for covering telegraph wires which are to be immersed in water. At about 115° F. it softens and becomes pasty, without losing its tenacity. At 104° F. it may be easily spread out in sheets, drawn into tubes, applied to any surface, or worked into any desired form. It will take the finest impressions from a mold. It is used for water pipes, moldings, and mixed with linseed oils for the molds employed in making electrotypes. It is insoluble in water, and but slightly soluble in alcohol and ether. Boiling olive oil dissolves a little of it, but deposits it again on cooling. The pure gutta is perfectly white, cakes together at 212° F., and begins to melt at 300° F. Gutta-percha is strongly attacked by ozonized oxygen and by strong hydrochloric acid. It rapidly deteriorates by oxidation when exposed to the air, especially in warm climates. It loses its flexibility, tenacity, and extensibility, and becomes very brittle and entirely useless for industrial purposes. Mixed with sulphur or certain sulphides, and heated to 260° or 300° F., the gutta-percha undergoes a change similar to that which occurs during the vulcanizing of caoutchouc. Gutta-percha is chiefly employed for coating submarine telegraph wires.

Pure caoutchouc freshly prepared is colorless and transparent. It is a bad conductor of heat and a nonconductor of electricity; develops electricity by friction; specific gravity, 0.920 to 0.962. Freshly cut surfaces adhere easily when pressed together. By cold or long quiescence it becomes hard and stiff, but not brittle.

Rubber is used in all the industrial arts. The gum is used in blocks, cakes, sheets, etc.; in tapes or threads in woven fabrics for the production of elastic tissues; as a varnish between two surfaces of cloth or on one surface, for waterproof fabrics; in solution as a cement; combined with sulphur, etc., as soft vulcanized rubber, for the manufacture of overshoes, gloves, clothing, gas bags, belting, fire hose, tubing, springs, artificial sponge, etc.; combined with a larger proportion of sulphur and cured at a higher temperature, as hard vulcanized rubber, or vulcanite, for combs, pen and pencil holders, rulers, buttons, syringes, jewelry, and colored with vermilion for mountings for artificial teeth, etc.; combined with asphalts, oils, sulphur, etc., and vulcanized, as kerite, for covering telegraph wire—a valuable substitute for gutta-percha for air lines, as it is not affected by atmospheric influences.

Waterproof fabrics are made by placing a varnish or paste of the gum dissolved in any of its solvents, between two layers of cloth (double-texture fabrics) or on one side of the cloth (single-texture fabrics). The poorest kind of rubber may be used for this purpose. An objection existed to the single-texture fabrics, as the rubber surface was liable to become sticky and adhere when exposed to the sun, closely packed, or brought in contact with perspiration, hot surfaces, grease, etc. This was prevented by the sincalor process, the nature of which was kept secret. It is also prevented by using vulcanized rubber, the mixture of rubber, sulphur, etc., being applied to the cloth by means of calender rolls, and vulcanized afterwards. Rubber cements, possessing astonishing adhesive properties, are made by combining solutions of caoutchouc in naphtha or other suitable solvent with other materials of a resinous character. Soft vulcanized caoutchouc was invented by Charles Goodyear. (See GOODYEAR, CHARLES.)

For soft vulcanite goods the purified and masticated gum is kneaded on the warm rolls with the proper proportion of sulphur—less than one fourth the weight of the gum, Goodyear's patent states, generally five to six per cent in practice. The following is a mixture in common use: Rubber, 16; sulphur, 1; whiting, 14; white lead, 2½; litharge, 2. The mass is kneaded, then taken from the rolls in the form of a thick sheet and rolled into smooth sheets. From these plastic sheets articles of any desired shape are readily formed. As the mixture is in this condition very adhesive, coated cloth can be cut and fashioned into overshoes, boots, fire hose, etc., each article consisting practically of one single piece after vulcanization.

The heating or vulcanizing is conducted in strong horizontal cast-iron cylinders (the heaters), one end of which is movable and serves as a door. The goods to be vulcanized are loaded on a car and run in on a railway which extends along the bottom of the heater. To prevent adhesion of the different articles, powdered soapstone (steatite) is freely used, the goods being often packed in boxes filled with this substance. When the heater is charged the door is securely fastened, and steam from a high-pressure boiler let in till the desired temperature is secured.

Hard vulcanized caoutchouc, vulcanite ebonite, or hard rubber, is prepared by kneading together sixteen parts of rubber and eight of sulphur, rolling the plastic mixture into sheets, rods, tubes, and other forms, and vulcanizing in a steam-tight heater. To secure a smooth, polished surface each article may be enveloped in tinfoil, which is stripped off after vulcanization. The articles are placed in the heater in trays filled with powdered soapstone or water. The product is very hard, possessing a spring-like elasticity, and admits a high polish. It may be colored jet black by the addition of litharge, red by vermilion. The vulcanite is not attacked by solvents, neither those which dissolve the pure caoutchouc nor the mineral acids and alkalies. It is also especially distinguished by the large quantity of electricity which it evolves when rubbed; hence it is used for the plates of electrical machines.

The consumption of rubber is growing enormously, chiefly on account of the increased demand in the bicycle, automobile, and electrical industries. The U. S. is the largest consumer, followed by Great Britain. Unless wasteful and destructive methods of collecting rubber are discontinued, the supply will diminish. Several governments have prohibited or restricted the collection of rubber in their territories, in order to give the plants time to multiply and recuperate. The world's production of rubber

was estimated, 1906, at over 75,000 tons, valued at $115,800,000. Of this amount approximately 30,000 tons were imported into the U. S.

Rub'ens, Peter Paul, 1577–1640; Flemish painter; b. Siegen, Westphalia; son of the secretary of William the Silent, who on discovering his intimacy with his wife banished him to Siegen. In 1588 Rubens went with his mother (Maria Pypelincx) to Antwerp, where he became page of Marguerite de Ligne, Countess de Lalaing, but soon left her to study art. In 1600 he went to Venice, and subsequently was connected with the court of Vincenzo di Gonzaga, Duke of Mantua, who sent him on a diplomatic mission to Spain. After residing in Rome, Milan, and Genoa, he returned to Antwerp, 1608, and was appointed court painter by the Archduke Albert, viceroy of the Netherlands. In 1620 he was called to Paris to decorate the gallery of the Luxembourg with allegorical illustrations of the career of Maria de' Medici. While there the Duke of Buckingham bought his entire collection of works of art for 100,000 florins.

In 1628 Philip IV appointed him secretary to the Privy Council. Scarcely had he returned to Flanders, 1629, when he was sent as envoy to England, where he was knighted. The pictures ascribed in whole or in part to Rubens, numbering according to Smith's *catalogue raisonné* 1,800, comprise history, portraits, landscapes, animals, and fruit and flower pieces, the collection in the Louvre being particularly rich. The finest are still in Antwerp, his "Descent from the Cross" and "Elevation of the Cross," the former generally considered his masterpiece, being in the cathedral. In the Pinakothek at Munich, which has nearly 100 of his works, is his celebrated "Battle of the Amazons." The British National Gallery possesses the "Rape of the Sabines," which has been called a "perfect nosegay of color," and the "Judgment of Paris." Animal vigor, in the representation of which he excelled, is seen with most effect in his bacchanal feasts and mythological subjects of the coarser kind. He seldom attempted to idealize the human figure, and his Madonnas, etc., are literally Flemish types of womanhood.

Rubia'ceæ. See MADDER FAMILY.

Ru'bicon, a small river of Italy emptying into the Adriatic, immortalized by the passage of Cæsar, 49 B.C. It then formed the boundary between Italy and his province of Cisalpine Gaul. To pass it would be a declaration of war against the senate. Whether the modern Luso or the Fiumicino was the Rubicon cannot be determined. A papal bull, 1756, pronounced for the Luso, which the peasants also call il Rubicone. The weight of argument, however, identifies it with the Fiumicino.

Rubid'ium, one of the alkali metals, discovered by Kirchhoff and Bunsen, 1860, as one of the first fruits of spectroscopic investigation; occurs in extremely minute proportions in some saline mineral waters, in association with cæsium (*q.v.*). The water of Bourbonne-les-Bains contains in 1,000,000 parts nineteen parts of chloride of rubidium. Some lepidolites contain it, associated with lithium and cæsium. The ashes of some plants, as the tea and the coffee plants, show it. It is a white metal with a yellowish tinge and silvery luster; soft as wax; melts at 101.5° F., and yields even below a red heat a greenish-blue vapor; kindles on water, and burns like potassium.

Ru'bies, Cape. See CAPE RUBIES.

Ru'binstein, Anton Gregor, 1830–94: Roumanian composer and pianist; b. Wechwotynetz, of Jewish parents; instructed by his mother, Villoing in Moscow, Liszt in Paris, and Dehn in Berlin; returned to Russia, 1848; studied in St. Petersburg for eight years, in meantime composing; made a concert tour, 1857, and created a remarkable sensation, both by his playing and his works. In 1858 he was appointed imperial concert conductor in St. Petersburg with a life pension; 1862, founded the St. Petersburg Conservatory, and remained its principal till 1867; 1869, was ennobled. He visited every European country and the U. S. in his concert tours. His compositions include fifteen operas, some of them being what he called sacred operas, such as "Paradise Lost," "The Tower of Babel," and "Moses"; six symphonies, of which the best known are the "Ocean," No. 2, op. 42, and the "Dramatic," No. 4, op. 95; overtures, piano sonatas and concertos, sonatas and concertos for other instruments, much chamber music, and numerous piano solos, and vocal pieces for one or more voices.

Ru'ble, or **Rouble,** principal Russian money of account; ruble of gold is worth 77.2 cents of U. S. money, while the paper ruble has different values, *viz.*, the official in gold as determined by the government for each year and the exchange. These are usually about 50 cents.

Ru'bric, any writing or printing in red ink. In MS. and printed missals the directions preceding the prayers and offices were usually written or printed in red ink; hence the term rubric is commonly used to denote the rules and directions for the performance and celebration of divine service. As the date and place on a title page were sometimes printed in red ink, and the place where the book was sold was given instead of that where printed, the word rubric has also been used to signify the false name, as many books printed at Paris bear the rubric of Genoa, London, etc.

Ru'by, or **Red Sap'phire,** variety of corundum. The finest and most highly prized rubies are of the so-called pigeon's-blood color; found in the valley of Mogok, Burma, where the mines have been worked by the Burmese for centuries, and are now leased by the British Govt. to a London syndicate. Lighter-colored rubies, sometimes almost pink, often very beautiful, occasionally with a tinge of purple or currant-wine color, are found at Ratnapura, Ceylon. More recently the mines in Siam have been extensively worked, and some fine gems have been found, although nearly all found there are very dark red, almost garnet-colored, frequently with a brownish tinge. Small rubies have been found in the vicinity of Franklin, N. C., and in the government of Perm, Russia. Rubies from one carat upward, when fine, are of great value, and when from two to four

carats in weight command from five to ten times the price of a white diamond of similar quality. A ruby of ten carats has been sold in the U. S. for about $50,000. The so-called reconstructed rubies are not, as generally believed, made by fusing small bits of ruby, but are artificial rubies made by a direct process, and are distinguishable by the presence of round bubbles and other peculiarities. The so-called Cape, Arizona, Colorado, and Utah rubies, often very beautiful, are fine pyrope garnets, possessing only very slight value compared with the true ruby.

Ruby Throat (*Trochilus colubris*), a species of humming bird, so named from the brilliant ruby-red color of its chin and throat; in summer is found in all parts of N. America, up to lat. 57° N., being thus remarkable for its extensive distribution.

Rudagi (rō-dä-gē'), Persian poet of the tenth century; sometimes called the father of Persian literature; named from the village of his birth; his poetical renown won him a place at the court of the Samanid Nasar II, ben Ahmad of Khorassan; is said to have composed more than a million verses; remains preserved are comparatively meager, but of high merit. Among the deplorable losses may be mentioned his translation of the Indian book of fables, "Kalilah and Dimnah," rendered into Persian from the Arabic version of Abd-allah ibn al Mukaffa.

Rud'beck, Olof, 1630–1702; Swedish scientist; b. Vesteraas; became professor in medical department, Univ. of Upsala; by discovery, at age of twenty-three, of the lymphatic canal, gained European renown; besides investigations in several branches of science, devoted himself to study of archæology and literature, both classical and Scandinavian, publishing several sagas and Swedish provincial laws (from 1679); best known by his "Atlantica," in which he sought to establish the identity of Sweden with Plato's fabled land and the Garden of Eden, and "Elysian Fields," a botanical treatise.

Rude (rüd), **François,** 1784–1855; French sculptor; b. Dijon; son of a blacksmith and stovemaker, who kept him at this work for several years; won the Grand Prix de Rome, 1812; settled in Paris, 1827; works include "Theseus Picking up a Quoit," "Departure for the War," group on Arc de l'Étoile in Paris, "Mercury Fastening his Winged Sandal" (Louvre), "Joan of Arc" (Luxembourg Garden), "Hebe and the Eagle of Jupiter," and "Love the Conqueror" (Dijon Museum), and many portrait statues and busts.

Ru'dolph I of Haps'burg, 1218–91; Emperor of Germany, founder of the imperial house of Austria; son of Count Albert IV of Hapsburg. Under his uncle, Emperor Frederick II, he served in Italy; on death of his father, 1240, succeeded to upper Alsace and other possessions; extended his dominions by conquest and marriage, and acquired so high a reputation for justice and prowess that he was chosen by many cities as their protector and military leader. In a conflict with the bishop of Basel, he was besieging that city, 1273, when he was unanimously chosen to the throne of Germany in preference to Alfonso of Castile and Ottocar of Bohemia. Basel opened its gates, Alfonso recognized Rudolph, and Ottocar was speedily overcome. After violating a truce, the latter fell in battle on the Marchfeld, August 26, 1278. Rudolph restored Bohemia and Moravia to Wenceslaus, son of Ottocar, but retained Austria, Styria, and Carniola for his own sons. He then established order and tranquillity in his dominions with the utmost rigor, and passed so many decrees that he was called "the living law." German was substituted for Latin in official documents. The Diet of Frankfort refusing, 1291, to choose his son Albert as his successor, he was succeeded by Adolphus of Nassau.

Rudolph II, 1552–1612; Emperor of Germany; son of Maximilian II of Hapsburg and Maria, daughter of Charles V. In 1564 he was sent to the court of Spain; 1576, succeeded his father in all his dominions. Rudolph, led by the Spanish court and the Jesuits, proceeded at once to undo the tolerant work of the preceding reign. The religious dissensions broke out in all their former bitterness, and Aix-la-Chapelle, the electorate of Cologne (where the dispute arose out of the ecclesiastical reservation), and the see of Strasburg became theaters of war. In 1608 a number of the Protestant states formed "the Union," and, 1609, the Catholic states established "the League." In Hungary his intolerance provoked an insurrection under Bocskay (1604). In 1608 he was forced to cede Hungary, Austria, and Moravia to his brother Matthias; and the Protestants of Bohemia extorted from him a "*Majestätsbrief*" guaranteeing the exercise of their religion. A new war was kindled in Germany by the disputed succession to the Jülich dominions. In 1611 an attempt against the liberties of Bohemia, whose capital, Prague, was his favorite residence, cost Rudolph the crown of that kingdom, which was transferred to Matthias. He was fond of science and the mechanical arts, but superstitious, and addicted to alchemy and astrology.

GARDEN RUE.

Rue, herb (*Ruta graveolens*) of the Old World (order *Rutaceæ*), having a strong smell

and poisonous qualities; once used as an aspergil for sprinkling holy water; was believed by the superstitious to be a powerful charm against witches; used in some places for flavoring food.

Ruff (*Philomachus pugnax*), a sandpiper, or wading bird of the subfamily *Tringinæ*; formerly common in the fens of England, but has nearly disappeared since its favorite haunts have been reclaimed and cultivated; still found

RUFF (*Philomachus pugnax*).

throughout N. Europe and Asia, and migrates S. in winter; is accidental on the E. coast of the U. S.; derives its name from a circlet of long, closely set feathers on the neck of the adult male, which he raises or lowers at pleasure.

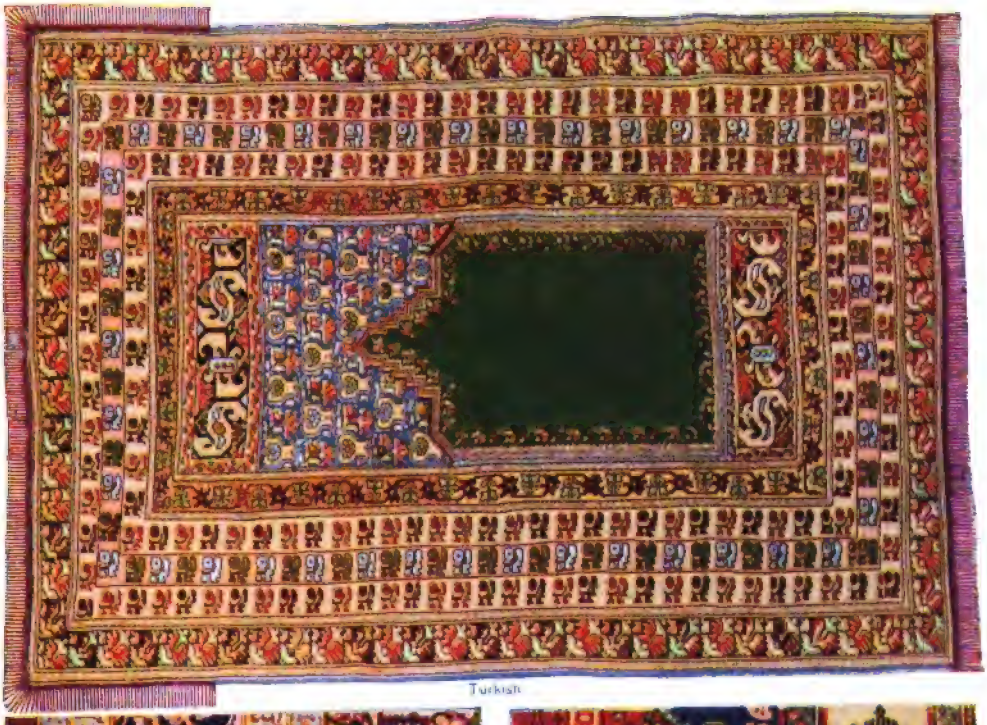
Ruffed (rŭft) **Grouse** (*Bonasa umbellus*), a species of the family *Tetraonidæ*, distinguished from other grouse by the absence of feathers on the lower half of the tarsi. It has also, on the sides of the neck, a ruff of soft, broad, and truncate feathers, to which the name refers. The species is generally distributed throughout the N. temperate parts of N. America, but is differentiated into several subspecies, or geographical races, *viz.*: (1) *Umbellus*, inhabiting the country E. of the Rocky Mountains; (2) *umbelloides*, inhabiting the Rocky Mountains and the interior of British America up to Yukon River; (3) *sabini*, found in Oregon, Washington, British Columbia, etc.; and (4) *togata*, from E. Oregon and Washington to Nova Scotia and Maine, ranging S. to the mountains of New England and New York. The species in some sections (New England and the W. states) is known under the name of partridge; in others (the middle states) as the pheasant; and in some of the British provinces, as the birch partridge.

Rug, carpetlike textile, made in one piece and used for floor service. The most artistic rug makers of the world are the Persians, who learned the art of weaving such fabrics from the Babylonians. Persian rugs were used by the patricians of Greece and Rome, and were distributed by the argosies of Venice throughout Europe, adorning the palaces and castles of the Middle Ages. The work on these Oriental fabrics is still done by hand, and each rug has its individuality, no two being exactly alike. They are woven on rude looms, the variations of design being infinite. The Persian rug remains the most original and durable of all such fabrics, and is the parent stock of all rugs made in the world. Many of the rugs of Persia are intended to cover divans or tables, or to hang as tapestry and portières. Such are often made of silk. The colors formerly employed in the rugs of Persia were imperishable, fabrics a hundred or more years old showing no deterioration in tint.

The Turkoman rugs are included commercially among the Persian rugs. The prevailing color of the Turkoman rugs being red, the weavers have shown a disposition to use aniline dyes. The rugs of Feraghan and Teheran have a loose texture and a velvety pile of medium thickness, the center being generally of a mixed pattern of small, irregular figures surrounded by a rich border. The rugs of Khorassan are of a richer texture than those of Feraghan, the patterns being celebrated for realistic flowers. In texture the Kerman rugs are more valuable than those of Khorassan and Feraghan. The Shiraz rug, which resembles the Kerman, has a heavy pile. Undyed camel's hair is used in S. Persia for the groundwork and border of rugs. There is a species of rug peculiar to Kurdistan, its texture suggesting knitted rather than woven work. It is called ghileem, or doru. The pattern is identical on both sides, thus allowing the use of either side. The colors are firm and brilliant, and the designs often of extraordinary beauty. The ghileems of Shuster are preferable for portières, while the Garrouste ghileems are more suitable for curtain hangings. The silk rug, once common in Persia, has been revived for foreign markets. One of the choicest rugs made in the East is the Khiva, often called the Bokhara. The colors are chiefly various shades of maroon, red, and blue, interwoven with a creamy white, the pattern consisting almost invariably of a many-angled, conventional figure.

The rugs of Daghestan have a closer pile than most Persian fabrics, with a surface rich and smooth. The Samarcand rug has a rich and heavy pile, soft as silk, the prevailing tone being a golden brown or a mellow gray. The figures of men and animals are never seen on Turkish rugs. Rugs made by the Uruks resemble the Kurdistan ghileems in texture, but are coarser, the design being usually in stripes.

The Abnakee rug is the product of an American industry located at Pequaket, N. H. These rugs usually have plain centers of solid color, terra cotta, old pink, tan dark blue, gobelin blue, yellow, or olive, with borders worked in two or three harmonious colors, the designs ranging from the Saracenic, Gothic, and classic to conventionalized floral patterns and to Aztec and savage ornament. The rugs are all wool and hand made. Each maker works an individual cipher on the rug woven. The cipher woven on the label of the Abnakee rugs is an Indian totem that appears on a treaty between the Abnakees and the English. See CARPET; MAT.



Turkish

Persian

Indian

ORIENTAL RUGS.

Rug'by, town of Warwick, England; on the Avon; 83 m. NW. of London; center of a great hunting district. Its celebrated school, founded 1567 by Lawrence Sheriff, acquired a national reputation under Thomas Arnold as headmaster (1828–42). Pop. (1901) 16,830.

Ruge (rō'gė), **Arnold,** 1802–80; German author; b. Bergen, island of Rügen; sentenced, 1824, to five years' imprisonment as member of a secret political society; published, 1830, a translation of "Œdipus Coloneus"; appointed Prof. of Æsthetics at Univ. of Halle, 1831, and attracted much attention as a philosophical critic in the "Hallische Jahrbücher" (1838–43); joined Karl Marx in Paris, and published with him the "Deutsch-französische Jahrbücher" (1843–45); published, 1845, "Zwei Jahre in Paris"; at Zurich and Leipzig published "Poetische Bilder" and "Politische Bilder"; elected German Parliament, 1848, and founded the same year the *Reform* at Berlin. This paper was soon suppressed, and, after some attempts at revolutionary intrigue in Dresden and Carlsruhe, he went, 1849, to London, where he formed a European Democratic Committee with Ledru-Rollin and Mazzini; later published "Manifesto of the German People."

Ruhmkorff (rōm'kŏrf), **Heinrich Daniel,** 1803–77; German electrician; b. Hanover; settled in Paris, 1839; brought out a convenient form of thermobattery, 1844; produced his famous coil, 1851.

Rule Britan'nia, British national song or hymn, the words of which were composed by David Mallet (1698–1765), and the music by Arne; first performed, 1740, as part of "Alfred, a Masque," by Mallet and James Thomson.

Rule Ni'si, in law, a rule or order obtained on an *ex parte* motion, which, after due service upon the party against whom the rule is obtained, will be made absolute, unless (*nisi*) the party appears and shows good cause why it should not be made absolute.

Rule of the Road. See ROAD, LAW OF THE.

Rum, spirituous liquor distilled from fermented molasses, the refuse juice and scum from the sugar making, and the spirit wash or lees (known as dunder) of former distillations. A peculiar volatile oil comes over in the first part of the process, which imparts to the rum its flavor. The making of rum has long been carried on in connection with that of sugar and molasses on the plantations of the W. India Islands. It was formerly largely made in New England, and was a prominent article of exportation to Africa in connection with the slave trade. Great quantities of liquor sold for rum are produced by flavoring and coloring rectified proof spirit.

Ruma'nia. See ROUMANIA.

Rume'lia. See ROUMELIA.

Rum'ford, Benjamin Thompson (Count), 1753–1814; American natural philosopher; b. Woburn, Mass.; taught an academy in Rumford (now Concord), N. H., 1770; soon after was made major in the militia of New Hampshire by the royal governor. This excited the jealousy of the older officers; he was charged with disaffection to the cause of the colonies, and driven from his home, when he took refuge in Boston; was later tried at Woburn, refused a full acquittal. In 1781 he commanded a royalist regiment of dragoons. After the war he entered the service of the elector of Bavaria, who knighted him. In 1796 he was appointed head of the council of regency. He went to England, 1798, and afterwards removed to Paris; married, 1804, the widow of Lavoisier, and spent the remainder of his life at Auteuil. He devoted his philosophical studies especially to heat. He gave much attention to the construction of chimneys, with principal reference to remedies for their smoking; and made many experiments and discoveries in regard to the strength of materials, the force of gunpowder, light, and illumination.

Rumi', Jalal ad-din, 1207–73; Persian Sufi poet and philosophic teacher; b. Balkh; was descended of high ancestry. His father, Baha ad-din Valad, was so famous for his learning and the influence of his teaching as to excite the enmity of the jealous sultan, and to be obliged in consequence to leave Balkh with his family; after various travels he settled at Iconium, Asia Minor, where he founded a college under the patronage of the sultan. His father died in 1231, and Jalal, an enthusiastic student, desirous for spiritual knowledge, fostered under his father's teaching, continued to pursue his studies, and succeeded ultimately to his father's chair, and to the superintendence of the colleges of Iconium. Sorrow, which came to him in the untimely death of his son and in the sad fate of a beloved teacher, seems to have deepened his religious devotion, to have given tone to his mystic philosophy, and at the same time to have enriched his poetic talents. He became the founder of the Maulavi sect of dervishes, and his zealous devotion to this order seems to have been a source of inspiration for his spiritual and mystic odes. His great work, "Masnavi," or "Mathnavi," comprises between 30,000 and 40,000 rhymed couplets, and is a production of high poetic merit, religious fervor, and philosophic thought.

Rump Par'liament, popular name applied in English history to a remnant of the Long Parliament; consisted of sixty members, who, after the expulsion of three fourths of that body, December 6, 1648 (known as Pride's Purge), were allowed by Cromwell to carry on the farce of legislation, and coöperated with him and with the army in effecting the trial and condemnation of Charles I. The Rump, having attempted to resist certain encroachments of the army, was dissolved by Cromwell, April 20, 1653; was restored by a military movement during the protectorate of Richard Cromwell; was a second time expelled by the army, October 13, 1659; reassembled on the advance of Gen. Monk from Scotland, 1660; and decreed its own dissolution, March 16, 1660.

Rum'sey, James, abt. 1743–92; American inventor; b. Bohemia Manor, Cecil Co., Md.; became a machinist; made several improvements in the mechanism of mills; 1784, exhib-

ited on the Potomac, in the presence of Gen. Washington, a boat which ascended the stream by mechanical appliances; 1785, was granted by the Assembly of Pennsylvania exclusive right for ten years "to navigate and build boats calculated to work with greater ease and rapidity against rapid rivers." A year later he introduced a steam engine of his own construction into his boat on the Potomac; obtained a patent for steam navigation from the State of Virginia, 1787; published at Philadelphia his "Short Treatise on the Application of Steam" (1788), which involved him in a controversy with John Fitch; organized at Philadelphia a Rumsey Society for the promotion of steam navigation, 1788; went to England; built a new steamboat; obtained patents in England, France, and Holland, and made a successful trip on the Thames, December, 1792.

Runes (Old Norse, *rúnir*, "secret signs," "mysteries"), ancient graphic system employed chiefly by the Teutonic races of N. Europe, though traces of its use are found also in France and Spain. Though gradually superseded by the Roman alphabet, the runes remained partially in use in Scandinavia till the close of the eighteenth century. There are several varieties of runic writing, classed as the Anglo-Saxon, the German, and the Norse. The last is thought to represent the oldest form. It has an alphabet of only fifteen or sixteen letters, while that of the Anglo-Saxons finally numbered as many as forty. Runes were mostly confined to inscriptions or carvings on rocks, stones, household utensils, weapons, and ornaments. They were supposed to possess a mysterious power, and were cut on smooth sticks, generally of beech, used for divination.

Runjeet' Singh (sing), 1780–1839; maharajah of the Punjab, commonly known as the King of Lahore; b. Gugaranwalla; poisoned his mother when he was seventeen, and assumed the government himself; by aid of French officers, organized and disciplined his army and subjugated the neighboring Sikh chiefs. A friendly agreement was concluded with the East India Company by which the Sutlej was established as the boundary of his dominions. He then attacked the Afghans, conquered Kashmir, 1819, and Peshawur, 1829, and at his death left an empire comprising more than 20,000,000 inhabitants and a disciplined army of 70,000 men.

Run'nymede, or Runnimede, slip of meadow stretching along the right bank of the Thames, near Egham, Surrey, England; memorable as the spot where the signature of King John to Magna Charta was extorted by the insurgent barons, June 19, 1215. Charter Island, in the river close at hand, is sometimes claimed as the locality of this event. Runnymede has been from time immemorial noted for the annual Egham horse races, whence some authorities derive the name (*i.e.*, Runningmead).

Rupee', silver coin current in India, having a value of one shilling fourpence, English money. From 1835 to June 26, 1893, it was the standard of value; during the period 1893–1900 the coinage of rupees was suspended; since 1900 they have been coined as required to meet public demands. Different Indian princes struck rupees varying considerably in weight and value. A lakh of rupees is 10,000; a crore, 10,000,000.

Ru'pert, or Rob'ert (Prince), 1619–82; English military officer; b. Prague, Bohemia; son of Frederick V, elector palatine and King of Bohemia, by his wife Elizabeth, daughter of James I of England; took part in the Thirty Years' War, having become a colonel of cavalry in active command at age of eighteen; commanded a regiment of royalist cavalry during the civil war in England, and distinguished himself in nearly all the battles. At the Restoration he was made a privy councilor and admiral of the fleet; was one of the founders of the Royal Society; first governor of the Hudson Bay Company, 1670; has been credited with the invention of mezzotint, of pinchbeck or prince's metal, and of the glass bubbles called Rupert's drops.

Rupert's Drops. See PRINCE RUPERT'S DROPS.

Rupert's Land, geographic designation used in the older literature for the region about the S. part of Hudson Bay, being the territory granted by Charles II to his cousin, Prince Rupert.

Rup'ture. See HERNIA.

Ru'rik (Old Norse, HRÖRIKR), d. abt. 880, founder of the Russian Empire, a Varangian from Sweden. Invited by the Slavs living on the shores of Lake Ladoga, he and his brothers Sineus and Truvor crossed the Baltic and subjugated this region. He soon extended his dominion to the E. and S., and, 862, established himself in Novgorod and ruled the country as absolute monarch until his death. His descendants ruled Russia until 1598, and Russian princes still trace their pedigrees to Rurik.

Rush, Benjamin, 1746–1813; American physician; b. Philadelphia, Pa.; Prof. of Chemistry in Medical College of Philadelphia; member Continental Congress; signer of Declaration of Independence; physician general of the army, 1777–78; treasurer of U. S. mint from 1799 till death; author of "Medical Tracts," "Medical Inquiries and Observations," and "Diseases of the Mind."

Rush, Richard, 1780–1859; American statesman; b. Philadelphia, Pa.; son of preceding; became Attorney-general of Pennsylvania, 1811; soon after Comptroller of U. S. Treasury; U. S. Attorney-general, 1814–17; then temporary Secretary of State; minister to England, 1817–25; negotiated treaties respecting the fisheries, the NE. boundary, and the Oregon question; Secretary of the Treasury, 1825–29; minister to France, 1847–49; author of "Washington in Domestic Life," "The Court of London from 1819 to 1825," and "Memoranda of a Residence at the Court of St. James."

Rush, any plant of a family (*Juncaceæ*) of monocotyledonous herbs, of which the genus *Juncus* is the type; also any one of various

plants belonging to the *Cyperaceæ* (mostly species of *Scirpus*), with naked, tough, and flexible stems. There are many species, mostly in wet and cold regions. They are employed in making chair bottoms, mats, etc. Rushes were used in Europe for strewing the floors instead

Common or Soft Rush.

of carpets. The pith of some kinds is used sometimes for a candle wick; hence the name rushlight. Most of the numerous species found in the U. S. are also European and Asiatic. *S. lacustris* is called bulrush in the East, and tule in California, where it covers vast areas of wet land.

Rus'kin, John, 1819–1900; English art critic; b. London; son of a wealthy wine merchant, a Scotchman by birth, from whom he inherited a large fortune; in youth traveled extensively on the Continent; gained the Newdigate Prize at Oxford, 1839, by a poem, "Salsette and Elephanta"; contributed verse to annuals and miscellaneous periodicals up to 1846; issued collections of amateurish poems, 1850, 1891. He first drew public attention by his "Modern Painters" (volume i, 1843), which exalted Turner and his school in the art of landscape painting above Claude, Poussin, and their imitators; in preparation for later volumes and for other works, he spent many years in the study of art, residing for protracted periods in Italy and Switzerland; appointed professor of the Cambridge School of Art, 1858; became Rede Lecturer at Cambridge, 1867; Slade Prof. of Fine Arts at Oxford, 1869–79, 1883–84; published a series of letters, 1871–84, entitled "Fors Clavigera," addressed to workingmen, inviting them to join him in establishing a fund for rescuing English country life from the tyranny and defilement of machinery. In pursuance of this object, the St. George's Guild was formed; a building was bought at Walkley, in the suburbs of Sheffield, for use as a museum, and the money subscribed was used to promote coöperative experiments in agriculture, manufacturing, and education. In 1871 he bought Brantwood, a property at Coniston in the lake country of England, and thereafter lived mostly in retirement. Among his works on art are "The Seven Lamps of Architecture," "The Stones of Venice," "Pre-Raphaelitism," "Giotto and his Works in Padua," "The Elements of Drawing," "The Two Paths," "The Elements of Perspective," "Lectures on Art," "Arata Pentelici," "The Relation between Michael Angelo and Tintoret," "The Laws of Fesole," "The Art of England," "Verona and Other Lectures." After 1860 his writings took a wider range, including speculations in ethics, social science, and political economy, with studies in mythology, botany, and æsthetics, set forth in little volumes under fanciful titles, such as "Unto this Last," "Munera Pulveris," "Sesame and Lilies," one of his most popular works; "The Ethics of the Dust," "The Crown of Wild Olive," "The Queen of the Air," "The Eagle's Nest," "Love's Meinie," "Proserpina," "Deucalion," "St. Mark's Rest." The author denounces competition in trade and the *laissez-faire* theory in government; approves of paternalism and a modified form of state socialism, and praises the guild system of the Middle Ages; declaims against railways, factories, and machinery, and proposes to restore artistic handiwork by trained workmen. Among his numerous publications should also be mentioned "The King of the Golden River," a favorite fairy tale; "Arrows of the Chace," a collection of his letters in two volumes; and the fascinating but incomplete "Præterita," an autobiography.

Rus'sell, Charles Russell (Baron), 1833–1900; British jurist; b. Newry, Ireland; admitted to the bar, 1859; appointed a Q. C., 1872; member of Parliament, 1880–86, when he was appointed Attorney-general, and knighted. Among his famous cases was the Parnell investigation, in which he was Parnell's counsel. In 1892 he again became Attorney-general; was one of the British counsel in the Bering Sea arbitration case; became, 1894, a Lord of Appeal in Ordinary (with a life peerage), and was made Lord Chief Justice and a baron.

Russell, Henry, 1813–60; English singer and song composer; b. Sheerness; went to New York City, 1832, where he married, and where his son, W. Clark Russell, the sea novelist, was born. He composed more than 800 songs, including "A Life on the Ocean Wave."

Russell, John, 1745–1806; English painter; b. Guilford, Surrey; worked chiefly in London; obtained prices equal to those paid to Sir Joshua Reynolds; made A. R. A., 1772; works include portrait in oil of William Wilberforce, when a child; pastel portrait of Richard Brinsley Sheridan, the dramatist and orator. He published a book on oil painting; one entitled "Elements of Drawing with Crayons"; drew and engraved a lunar map and also an elaborate machine called the selenographia, for showing the moon's phases.

Russell, John Russell (Earl), 1792–1878; British statesman; b. London; third son of sixth Duke of Bedford; entered Parliament as a Whig, 1813; parliamentary leader of the great movement which effected, 1828, the repeal of the Test and Corporation acts; 1829,

the emancipation of the Roman Catholics; 1832, secured the long-delayed victory of the Reform Bill. He was paymaster of the forces, 1830–34; Secretary of State for the Home Department, 1835–39, and for War and the Colonies, 1839–41; represented the city of London in Parliament for many years after 1841; led the opposition to the Peel Ministry, 1841–45; became Prime Minister and First Lord of the Treasury, 1846; Secretary of Foreign Affairs, 1852; introduced a new Reform Bill, 1854; became Colonial Secretary, 1855; lost favor by supporting the Austrian programme in the Vienna Conference, and retired, July 16th. Returned to office, 1859, as Secretary of Foreign Affairs; elevated to peerage, 1861; incurred severe criticism by his course toward the U. S. during the Civil War; again became Prime Minister, 1865, Gladstone, however, being the real head of the cabinet, which resigned, June, 1866. Author of "Essay on the History of the English Constitution and Government," "Affairs of Europe from the Peace of Utrecht," "Rise and Progress of the Christian Religion in the West of Europe," etc.

Russell, William (Lord), 1639–83; English statesman; son of the fifth Earl of Bedford; entered Parliament, 1660; first became prominent, 1673, as one of the leaders of the Protestant or "country party," which carried on an opposition to the measures of the court; on June 16, 1680, appeared before the king's bench in Westminster to present the Duke of York as a recusant, and headed the deputation of 200 members of the House of Commons which carried up to the House of Lords the bill for the exclusion of James as a papist from the succession. With Sidney and other prominent Whigs accused by suborned witnesses of participation in the Rye House plot, he was arraigned for treason, attainted and beheaded. His attainder was reversed after the revolution of 1698, and, 1694, his father was made Duke of Bedford, to which title Lord William's son, Wriothesley, succeeded.

Russell, Sir William Howard, 1821–1907; British journalist; b. Dublin, Ireland; settled in London, 1842; reporter and correspondent to various papers; after 1847 permanently attached to staff of the *Times*; special correspondent of that journal in the Crimea, 1854–55; in India during the Sepoy Mutiny, 1861, and in U. S. during Civil War, 1861, where he earned the nickname of Bull Run Russell, in consequence of his criticisms of the Union troops during the battle. He was also war correspondent of the *Times* in the Franco-German War, 1870, and of the *Daily Telegraph* during the S. African War, 1879–80. In 1875 he accompanied the Prince of Wales to India, as honorary secretary; knighted, 1895. Published his Crimean War correspondence, "My Diary in India," "My Diary during the Last Great War" (1873), "The Prince of Wales's Tour," "Hesperothen," etc.; established *The Army and Navy Gazette*, 1860, and was its editor.

Rus'sia, formerly the largest continuous empire in the world; covered E. Europe and N. Asia; occupied about one seventh of the earth's total land surface; had extreme length from W. to E., 6,000 m.; width from N. to S., 2,300 m.; was bounded N. by the Arctic, E. by the Pacific, S. by China, Independent Turkestan, Persia, Asiatic Turkey, and the Black Sea; W. by Roumania, Austria, Germany, the Baltic, and the Scandinavian Peninsular. Area, since the treaty of Portsmouth (1906), 8,647,657 sq. m. of which 6,207,662 belonged to Asiatic Russia, including Siberia, Turkestan, the entire region of Caucasus, and the Trans-Caspian region, and 1,996,743 sq. m. to European Russia, to which this article is mostly restricted. Pop. (1897, since which year no census has been taken) 129,194,297—Russia in Europe having 107,446,199, and Russia in Asia, 19,125,326, Siberia's pop. being 5,569,382.

Owing to the disintegrations, already accomplished and in progress of consummation, and the widespread reign of terror, disorder and political changes, it is impossible at the present time to consider Russia as a settled state. The greater part of the following article must therefore be considered as applicable to the Russia of pre-war days.

European Russia forms one vast plain, broken occasionally by minor table-lands like the Valdai Hills in Novgorod and Tver, and stretching to the Ural Mountains on the E. and the Caucasus in the SE., which form the conventional division between Europe and Asia. In the Crimea is the isolated chain of the Yaila Mountains, rising at one point 5,000 ft. In the SW. are some slight spurs of the Carpathian Mountains, and in the NW. branches of the Scandinavian range. To the N. and NW. the plains are marked by immense forests and numerous lakes; to the S. by dry and treeless steppes. In the middle, W. and central S. region is the fertile wheat land. From a broad central plateau the country naturally divides itself into the four great basins of the Arctic Ocean, the Baltic, the Black and the Caspian Seas, traversed by the greatest rivers of Europe. The frozen, swampy, sterile basin of the Arctic is coursed by the Onega, Dwina, Mezen, and Petchora. The Baltic receives the Neva, Duna, Niemen, and Vistula. To the Black Sea flow the Pruth, Dniester, Bog, Dnieper, and Don, and into the Caspian empty the Ural and the Volga, which is the great water highway of Russia.

Climatic conditions present great differences in the extremes. Cold winters and hot summers are the rule. Mean temperatures of the hottest and coldest months in the different parts of the country vary as much as 83°; in a small area in the S. the climate corresponds to that of central Italy or the E. shore of Virginia; mean yearly temperature varies from 28.4° F. in the far NE. to 59° on the SE. coast of the Black Sea. Mineral products include coal, the Don region and Poland yielding most of the supply; gold, silver, platinum, copper, lead, zinc, iron, mercury, tin, rock salt, petroleum (Baku district), manganese, asbestos. European Russia may be divided in regard to the composition, properties, and fertility of the soil into two vast regions by a line drawn from Bessarabia in the SW. to Ufa in the NE.; SE. half, the Chernoziom or "black-earth" region (that of the Steppes); in this are considerable

areas of lime soil, the largest being in the valley of the Volga below Simbirsk; salt marshes here and there render some lands entirely barren; N., or non-Chernoziom region, all possible soils found. Productions of empire include cotton and rice, found growing farther N. than in the U. S.; most valuable portion of empire that S. of the Valdai Hills and of Moscow, extending to the Volga on the E. and to the frontier of Galicia on the W., and including the country of the Don almost to the Sea of Azov; wheat grown in this region is exported in vast quantities; rye, oats, barley, and maize pretty generally grown, and in the Baltic provinces, flax, hemp, and hops. Manufacturing, which began a vigorous growth after the emancipation of the serfs (1861) has as its chief branches the working of cotton, preparation of food products, and the making of woolens and silks and leather; tobacco, cigars, etc., and beet sugar. Trade of the empire carried on chiefly through its European frontier, Black Sea frontier of the Caucasus, Asiatic frontier, and with Finland. Principal exports: articles of food, raw and half-manufactured goods, including timber and wooden goods, flax, furs, and leather. Principal imports include tea, fish, wines, ale and spirits, raw cotton and wool, raw metals, machinery, coal and coke.

The population of Russia is divided among more than 110 nationalities, belonging to the branches and groups of the Mediterranean and Mongolian races, and speaking more than forty languages; Slavs constitute about three quarters of the entire population, however, and the Russian people proper about two thirds of the whole; Poles form about one twelfth or one thirteenth of the whole people. A vigorous national policy has been for many years in operation for the Russianizing of the Poles and also the small non-Slavic elements. Principal non-Slavic races: the Fins in Finland, the Germans in the Baltic provinces and S. Russia, the Tartars, and other tribes of Mongolian derivation in the SW., and the Jews, chiefly concentrated in Poland and W. Russia. The Russians themselves are subdivided into Great, Little, and White Russians, the first greatly preponderating, and their tongue being the accepted language of the empire and used by the government and a great majority of the people.

Government a constitutional hereditary monarchy. Administration exercised by four bodies, including the Committee of Ministers, each of whom is named by and responsible directly to the sovereign, and the Council of the Empire, originally consisting of sixty to seventy members, appointed by the czar and including several members of the royal family, whose duties were to review projects of laws presented by the ministers and to consider the annual budget. In 1906 an imperial ukase announced the reorganization of the Council as a second chamber in conjunction with the Douma, an elective body representing the people, as the first chamber, the members of the second chamber to be partly nominated by the czar and partly elected. The third body, the Ruling Senate, promulgates the laws and constitutes the high court of justice; its members are chosen by the czar, and are chiefly persons of high rank or office. The fourth body, the Holy Synod, is composed of the metropolitans and bishops of the church, and has the superintendence of religious matters.

Revenue of the imperial government (1912) about $1,582,255,000; expenditure the same, according to estimates submitted to the legislature, 1911; chief sources of revenue: excise on spirits, tobacco, and sugar; customs and stamp duties, and returns from state domains; emperor's revenue comes from the vast crown domains, which include cultivated lands, forests, and mines. Russian army consists of the European, Caucasian, Turkestan, and Amur armies, and its total strength is abt. 1,800,000.

Established and official religion of the empire that of the GREEK CHURCH, or Orthodox Catholic faith, of which the czar is head. General level of education low, and the illiteracy of European Russia about 77.1 per 100 inhabitants. Higher institutions include universities at Petrograd, Moscow, Kiev, Kharkov, Dorpat, Warsaw, Kazan, Odessa, and Tomsk. Finland has a university at Helsingfors, and is noted for its low percentage of illiterates.

The ancient history of Russia is involved in great obscurity. The Greek and Roman writers mention the Scythians and the Sarmatians as the inhabitants of the vast and unknown regions of the N., especially between the Don and the Dnieper. The Greeks established some colonies in the territory. During the migration of nations in the fourth and the following centuries, Russia witnessed the movements of hordes of Goths, Alans, Huns, Avars, Bulgarians, and others. Soon after the name of the Slavs appear for the first time. The people now known as Russians are a compound product of the various Slavic tribes, of many Scythic tribes, especially the Tartars, who in the Middle Ages oppressed Russia for centuries, and of Finns. About one hundred years later the principality of Novgorod appears struggling against the invasion of the Varangians (called by the Slavs Rus), a tribe of Northmen, and invited Rurik, Prince of the Varangians, to Novgorod, where he arrived abt. 862, and laid the foundation of the Russian Empire.

For nearly two hundred years the country remained under the autocratic power of the descendants of Rurik, until the Russian monarchy was finally changed into a confederacy. The power of the nation was broken by internal wars, the aggressions of the Poles, Lithuanians, Danes, and Teutonic knights, and the invasion of innumerable hordes of Mongols early in the thirteenth century under Genghis Khan and his sons, and afterwards under Batu. With reference to the Tartar invaders, a better era began only with Ivan (John) I. Kalita, Prince of Moscow (1328–40).

A new period in the history of Russia begins with its entire deliverance from the rule and influence of the Mongols through Ivan III, surnamed the Great (1462–1505). He was the first who assumed the title of autocrat of all the Russias. Under the reign of Basil IV (1505–33), the last semi-independent principality ceased by the final incorporation of Pskov, 1510. His son Ivan IV (1533–84), surnamed the Terrible, with all his bloody cruelty, contributed

more to the greatness of Russia than any of his predecessors. In 1581–82 a Cossack freebooter, Yermak Timofeyeff, conquered Siberia for him. With Feodor I the house of Rurik became extinct.

In 1612 the Poles were forced to evacuate Russia. In the next year the Russians elevated to the throne Michael Feodorovitch Romanoff, the first czar of the present imperial family. The borders of his Asiatic possessions were extended, 1639, to the Pacific. Under his son Alexis (1645–76) the Cossacks acknowledged the sovereignty of the czar. The reign of his son Feodor III (1676–82) was signalized by many important reforms. His imbecile brother Ivan was heir apparent, but Feodor willed the throne to his half brother Peter, known in history as the Great; but Peter obtained sole power, 1689, only after overthrowing Sophia, Ivan's sister. In a brief time he transformed the entire nation, and Russia became the most powerful empire of N. Europe. In 1703 Peter founded St. Petersburg, which became the capital. After repeated defeats, his victory over Charles XII at Poltava (1709) destroyed the superiority of Sweden, and led to accessions of territory. He was equally successful against the Persians, who ceded several territories on the Caspian. His wife and successor, Catharine I (1725–27) made likewise many important improvements. She was succeeded by Peter II, a grandson of Peter I.

At his sudden death (1730) the crown devolved on Anna, daughter of Ivan Alexeyevitch, half brother of Peter the Great. The Kirghiz tribes in 1731 submitted to the protectorate of Russia, but the Persian provinces were lost. After her death (1740), her grandnephew, Ivan, was proclaimed czar under the regency of Duke Biron of Courland; but he was soon dethroned by Elizabeth (1741–62), daughter of Peter the Great and Catharine I, who supported Austria in the Seven Years' War. She was succeeded by Peter III, son of her sister, who lost the crown and his life by a court revolution, at the head of which was his wife, who ascended the throne as Catharine II (1762–96). During her reign Russia made decided advance as an influential power. Catharine took a prominent part in the dismemberments of Poland, 1772, 1793, and 1795, and received nearly two thirds of the Polish Kingdom; and wrested from the Turks the Crimea, Azov, and several other territories. Commerce, navigation, and industry greatly improved under Catharine. Her son Paul I (1796–1801) took an active part against France in the war kindled by the revolution, but finally went over to Napoleon's side.

His son Alexander I (1801–25) conceived large policies, raised Russia to the foremost place in the continental balance of power, shared with Austria the defeat at Austerlitz (1805); after the disastrous battle of Friedland (1807), accepted the Peace of Tilsit, allied himself with his former enemy, and closed the ports of Russia to Great Britain. Alexander wrested Shirvan from Persia, acquired Finland from Sweden by the Peace of Frederikshamn (1809), and after a war with Turkey added Bessarabia. Growing restive under the continental blockade, he broke with Napoleon, and the latter, 1812, invaded Russia. In 1813 Prussia and Austria joined Russia in war against France, and the battle of Leipzig left Alexander foremost among the victorious sovereigns. Out of newly acquired Polish territories he formed the Kingdom of Poland under his own scepter. His death (1825) hastened the outbreak of a revolutionary conspiracy, but his brother and successor, Nicholas I (1825–55) suppressed it. In a war with Persia, 1826–28, Russia gained the provinces of Erivan and Nakhitchevan, and the exclusive control of the Caspian Sea. War with Turkey, begun 1828, ended in the cession to Russia of the mouths of the Danube. An insurrection in Poland, 1831, was suppressed, and that kingdom was reduced to a province.

In 1853 began the Crimean War, which was brought to a close by Alexander II (1855–81), son of Nicholas. By the Treaty of Paris (1856) Russia relinquished the right to keep war vessels on the Black Sea, lost a part of Bessarabia, and was obliged to cede the Danube mouths; but during the Franco-German War, when no resistance could be made, she announced her resumption of supremacy on the Black Sea, and Bessarabia was restored by the Treaty of Berlin (1878). Alexander opened the empire more than ever to the arts, ideas, and civilization of the W., and, 1861, gained the title of "The Liberator," by decreeing the emancipation of the serfs. A fresh Polish insurrection was suppressed with great vigor, 1861; a persistent revolt in the Caucasus was ended, 1859. Russia's steady advance into central Asia brought, 1865–68, Tashkend, Khojeni, and Samarcand successively into her hands. Meantime, 1867, Alaska, which had been occupied since the reign of Paul, was sold to the U. S. The conquest of central Asia was completed by the Khiva expedition, 1873, ending in the capture of Khokan, 1875. Outbreaks of the Slavonic Christians within the sultan's domains led Russia, 1877, to war with Turkey. The Treaty of San Stefano (1878), modified by the Congress of Berlin, enlarged Servia, made Roumania independent, and created free Bulgaria.

During Alexander's reign nihilism developed rapidly, but his progressive policy continued, and a constitutional project, providing for a consultative assembly of delegates elected by the provincial zemstvos, was about to be proclaimed when the emperor was assassinated (1881). His son and successor, Alexander III (1881–94) was desirous of carrying out this project, but under Ignatieff, Minister of the Interior, reactionary forces became dominant.

His son and successor, Nicholas II (1894– ?), maintained the old traditions and policy in the main. Proposals made by him, 1898, resulted in the international peace conferences at The Hague, 1899 and 1907. Russia steadily pushed her colossal Trans-Siberian Railway and her Asiatic schemes till the RUSSO-JAPANESE WAR, (*q. v.*). A national representative assembly, called the Douma (*q.v.*) was created in 1905. In 1914 Germany declared war against Russia in consequence of mobilization against Austria-Hungary in support of Servia.

Then followed several declarations and counter-declarations of war. Russia was obliged by treaties to support France and Servia. In the

early part of the struggle that ensued Russian armies scored successes of high import, but when the Czar took personal command of his armies, the situation changed quickly and disastrously for Russia. The Douma, March 12, 1917, carried through a *coup d' etat*, as a result of which the Czar abdicated. One form of government after another came into brief existance, till early in 1919 the Bolsheviki faction seemed to have gained domination. They occupied many important places, including Petrograd and Odessa, and for a time held the mastery, but later in the year their power waned rapidly.

In the treaty, framed by the Peace Conference in 1919, Germany agreed to respect as permanent and inalienable the independency of all territories which were part of the former Russian empire, to accept the abrogation of the Brest-Litovsk and other treaties entered into with the Maximalist government of Russia, and to recognize the full force of all treaties entered into by the Allied and associated powers with states which were a part of the former Russian empire.

A persistant rumor that the Czar and Czarina had been murdered early in 1919 lacks authentic confirmation.

Russia Leath'er. See LEATHER.

Russ'niaks, or Red Rus'sians. See RUTHENIANS.

Rus'so-Japanese' War, conflict, 1904–5, originating in Japan's irritation over the loss of the Liao-tung Peninsula, ceded to her by China after the war of 1894–95, but wrested from her by Russian diplomatic measures; by Russia's steady aggressions in Manchuria, occupied by that power after the suppression of the Boxer rebellion; by Russia's failure to withdraw, 1903, according to agreement; and by Russia's gradual encroachment on Korean territory. On January 8, 1904, Japan made a formal demand of Russia that she promise to maintain the independence and integrity of the Chinese Empire. This referred especially to Manchuria. Russia in reply proposed that Japan acknowledge Manchuria to be outside her sphere of interests, and offered to guarantee Japanese rights under the treaties with China, and also proposed the establishment of a neutral zone in Korea. The same day (February 6th) diplomatic relations between the two governments were broken off. Attacks, February 8th–9th, on the Russian fleet and fortifications at Port Arthur by the Japanese fleet, and a naval battle, February 9th, off Chemulpo, Korea, in which two Russian cruisers were destroyed, hastened the general conflict. Russia formally declared war February 10th and Japan February 11th; the U. S., China, Germany, and other powers soon issued proclamations of neutrality.

The Russian forces in Manchuria were placed under Gen. Kuropatkin. The first Japanese troops, under Gen. Kuroki, landed in Korea February 18th, and after winning the small battle of Chonju, March 28th, forced the passage of the Talu River, May 1st, outnumbering and outmaneuvering the Russians, their loss being 1,000, while that of the Russians was 2,390. Meanwhile, Admiral Togo had sealed Port Arthur by sinking steamers in the harbor mouth. On May 5th a second Japanese army, under Gen. Oku, arrived at the Liao-tung Peninsula, and divided into two columns, one being sent across the isthmus to seize Port Adams and to cut the railway to Port Arthur. On May 12th the Russians evacuated Dalny, after destroying the dockyards. The Japanese were repelled near Kinchow and Fengwang-cheng, in the middle of May, but at Manshon Hill, near Kinchow, May 26th, Gen. Oku drove the Russians back, capturing 68 cannon and 10 machine guns. This victory enabled Dalny to be used as a sea base. A force under Gen. Nogi was now sent to invest and attack Port Arthur. Sinyen was captured by the Japanese June 8th, and the Russian position at Vafangow a week later. June 15th the Russian squadron sank three Japanese transports, causing a loss of 1,400 men. The Russian army retreated slowly to the N. Some of the outer defenses of Port Arthur were captured July 11th, and a few days later two Japanese armies were brought together. After engagements at Taschichiao, Niotingling Pass, and other places, the entire Japanese force was thrown against the Russian force near Hicheng and along the railroad, with the result that after three days' fighting the Russians retreated toward Liaoyang.

On July 31st the Japanese made a general assault on the defenses of Port Arthur, but were repelled with heavy loss; but, August 2d, captured San-tai-kow, one of the city's defenses. The capture, August 19th, of An-shan-chan, the key of the Russian line between Liao-yang and Haicheng, compelled a further Russian retreat. August 14th–19th two Russian cruisers were destroyed in naval actions. A nine days' battle at Liao-yang (August 24th–September 2d), between 200,000 Russians and 240,000 Japanese, ended in the turning of the Russian right flank, and the retreat of that army to Mukden. Meanwhile, the Russian fleet at Port Arthur had made several sorties, not without damage inflicted by the Japanese fleet under Admiral Togo. An attempt to escape, after the Japanese had captured Wolf's Hill, which commanded the harbor, led to a battle, August 10th, which resulted in serious damage to the Russian vessels, and only a part of the fleet regained the harbor. The Vladivostok squadron, on attempting to coöperate, was cut off by Admiral Kamimura, and one of its three cruisers was sunk. The Baltic fleet sailed for the Far East in October, and on its way fired on an English fishing fleet on the Dogger, the mistake, committed at night, being excused by the Russian officers on the ground that Japanese torpedo boats had been observed among the trawlers. The immediate result was a great excitement in England and preparations for war. The difficulty was settled by a commission after the plan of The Hague tribunal.

On May 27th the Russian fleet entered the Tsushima Strait, between Japan and Korea. Admiral Togo at once attacked it, and, May 27th–28th, sunk 22 vessels, captured 5, and took 7,284 prisoners. The Japanese lost 3 tor-

pedo boats, and had 116 killed and 538 wounded. The remnant of the Russian fleet (9 vessels) fled, but 3 cruisers were interned at Manila, 1 at San Francisco, and a fifth was wrecked. The naval losses of the war in sunk, captured, and interned vessels was, on Russia's side, 83; on Japan's, 12. The investment of Port Arthur had continued with many bloody engagements and with enormous losses to the Japanese. The outer forts and positions were captured one by one, and a general attack on the center of the permanent forts, November 26th, gave the Japanese 203-Meter Hill, commanding the harbor and dockyard. Meanwhile the two main armies moving toward Mukden had had a number of battles, the heaviest (a six days' engagement) taking place October 9th–15th, on the line of the Shakhe River, 10 m. S. of Mukden, and the Russians were driven from their positions, with total casualties of about 60,000, those of the Japanese being 15,880. Both armies fortified their positions on the Shakhe, and no further fighting occurred in 1904.

Admiral Alexieff, commander in chief of the Russian forces, was now replaced by Gen. Kuropatkin. The formidable forts around Port Arthur were successfully mined by the Japanese and taken with terrible losses, and by January 1, 1905, the whole ridge of hills E. of the town, and most of those on the W., were in Gen. Nogi's possession. Considering his position hopeless, Gen. Stössel, in command, opened negotiations for evacuation, and this took place January 7th. Besides immense quantities of small arms and ammunition and supplies of food, 528 serviceable guns and 41,641 combatants came into the hands of the Japanese. The fall of Port Arthur set free Gen. Nogi's army, and this working in concert with the rest of the army, which had taken several Russian positions, forced the Russians to the N., and, March 8th, cut the railroad line N. of Mukden and outflanked Kuropatkin. On the 10th took place the battle of Mukden, which ended in the rout of the Russians with loss of 130,000 in killed and wounded, and about 50,000 who were taken prisoners. The Japanese casualties were estimated at 52,500. Kuropatkin's forces fled, but suffered another defeat at Tie-ling, March 16th. Kuropatkin resigned the chief command to Gen. Linevitch. In July the Japanese obtained control of Sakhalin Island.

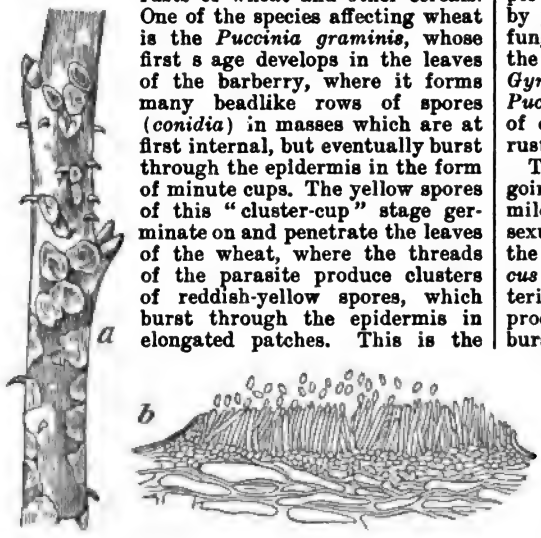
On June 8th Pres. Roosevelt urged the Russian and Japanese governments to open direct negotiations for peace, and this friendly proposal being acceptable, the peace envoys met at Portsmouth, N. H., August 8th. An armistice was agreed upon September 1st, and the treaty of peace was signed September 5th. Russia agreed to acknowledge Japan's paramount interests in Korea, to cede the S. half of Sakhalin, and to transfer to Japan the Liao-tung Peninsula. The high contracting parties agreed to evacuate Manchuria, to restore to China the exclusive administration of that country, to abstain on the Russo-Korean frontier from taking any military measures which might menace the security of Russian or Korean territory, and not to obstruct any general measures which China might take for the development of Manchuria. Japan had withdrawn, previously, her demand for an indemnity of about $600,000,000 for the payment of her war expenses. The total cost of the war to Russia was estimated at $72,800,000; the number of men killed, wounded, and captured at 388,480; Japan's loss in men at 167,402.

Russo-Turk'ish War, conflict between Russia and Turkey, 1877–78; caused by the failure of the latter power, on demand of Austria, Germany, and Russia, to introduce important reforms in the government of her Christian provinces, the murder of the French and German consuls at Salonica by the Turks, and the massacre of no less than 12,000 Bulgarians. Russia formed the Treaty of Reichstadt with Austria, July 8, 1876, stipulating that the latter power should obtain Bosnia and Herzegovina if Russia undertook to liberate Bulgaria. At the instance of Great Britain, another conference was held at Constantinople, demanding of the Porte the execution of the reforms, but Turkey remained obstinate. A final effort was made by the powers, in the London protocol, March 13, 1877, and on the Porte's rejection of this Russia declared war April 24th.

In the first battle of Plevna, July 20th, the Russians were defeated; in the second, July 30th, they fared still worse. Roumania now lent aid, and the allied forces regained Lovatz, which the Russians had taken and had been forced to yield, but in an attempt to capture Plevna were repulsed, with enormous losses. Todleben, the defender of Sebastopol, now took control of the operations around Plevna; the Turks were forced to surrender; the victors crossed the Balkans, captured one Turkish army at Shipka, routed another on their way to Adrianople, and entered that city January 22, 1878. The Porte had already begun to sue for peace, and, January 31st, the Russians granted an armistice. By the Treaty of San Stefano, March 3, 1878, between Russia and Turkey, Bulgaria, with its territory enlarged so as to include the greater part of European Turkey, was to constitute an autonomous tributary principality, whose prince, elected by the people, was to be confirmed by the Porte. Improvements were to be introduced in the administration of Epirus, Thessaly, and other parts of European Turkey; also in Armenia, whose inhabitants were to be guaranteed security from Kurds and Circassians. In lieu of part of the war indemnity claimed by Russia she was to receive the districts of Kars, Ardahan, Batum, and Bayazid in Asia, and the Dobruja in Europe, but the last-named district was to be ceded to Roumania in return for Bessarabia. By the Treaty of Berlin (July 13th), and after Russia had consented to certain modifications of the treaty, Bulgaria was limited to the country N. of the Balkans, the portion of Bulgaria S. of the Balkans was formed into the autonomous province of E. Roumelia, subject to the direct authority of the sultan. Austria gained Bosnia and Herzegovina, Turkey retained Bayazid. Subsequently Turkey ceded Thessaly and part of Epirus to Greece.

Rustam, or **Rustem** (rôs-tĕm'), great hero in the mythical times of ancient Iran; son of Zal and Rudabah. His feats of gigantic prowress and prodigious strength play a romantic rôle in the great Persian epic, the "Shah-Namah" (see FIRDUSI). The *haft khan*, or seven labors of Rustam, rival those of Hercules. The sad story of his slaying his own son Sohrab in single combat forms one of the most pathetic episodes in the "Shah-Namah."

Rusts, the popular name for various parasitic fungi of plants, especially for those which produce reddish or brownish discolorations. Botanists are inclined to restrict the term to the *Uredineæ*, which include the rusts of wheat and other cereals. One of the species affecting wheat is the *Puccinia graminis*, whose first s age develops in the leaves of the barberry, where it forms many beadlike rows of spores (*conidia*) in masses which are at first internal, but eventually burst through the epidermis in the form of minute cups. The yellow spores of this "cluster-cup" stage germinate on and penetrate the leaves of the wheat, where the threads of the parasite produce clusters of reddish-yellow spores, which burst through the epidermis in elongated patches. This is the "red-rust" stage, so common when the wheat is about full grown. The red-rust spores (called *uredospores*, or *stylospores*) serve to propagate the fungus still further; each one falling on a wheat leaf and finding sufficient moisture, germinates, and penetrates the epidermis, giving rise to another growth of parasitic threads, and another mass of red-rust spores. Somewhat later, the fungus forms small, dark-colored spore sacs, each containing two relatively large spores, which burst through the epidermis as elongated black patches. These spores, being thick-walled, are capable of remaining on the straw without injury during the winter, and in the following spring germinate in the moisture of the rotting straw, each spore forming a short thread on which are borne a few very minute spores (*sporidia*). When the latter fall on a young leaf of the barberry they germinate and penetrate its tissues, giving rise to the cluster cups first described, and thus completing the round of life.



RUST. *a*, cane rust of the raspberry (natural size); *b*, spores (highly magnified).

Another wheat rust, usually much more common than the one described above, is *P. rubigovera*. On the Great Plains of the central part of the U. S. it appears to live perennially in the uredo stage, without the intervention of the æcidium stage. At all times in the year, on some area upon the region stretching from the Rio Grande to the Saskatchewan, the uredo stage is to be found upon wheat and other cereals, and many grasses; and from this affected area it spreads from field to field every year. In the spring the uredo stage advances with the season from the S. portion of the region to the N. In Europe the æcidium stage, which occurs on *Boraginaceæ*, is well known, but in N. America, if it occurs at all, it is very rare. No remedy or preventive is known for the wheat rusts.

Apple rust is a common disease of the apple tree, in which the leaves become affected by yellow, swollen patches. It is caused by a fungus of the order *Uredineæ*, and is in fact the æcidium stage of one of the species of *Gymnosporangium*, a genus closely related to *Puccinia*. The early collection and destruction of every cedar apple will eradicate the apple rust.

The *white rusts* differ greatly from the foregoing *Uredineæ*, and are near relatives of the mildews, with which they agree in mode of sexual reproduction. A common example is the white rust of the cabbage (*Cystopus cubicus*), in which the parasite grows in the interior of the leaves of the host, eventually producing myriads of spores (*conidia*) which burst through the epidermis in white pustule-like patches. The *cane rust* of the raspberry and blackberry (otherwise called the raspberry anthracnose), is a troublesome disease, producing white patches on the stems, and eventually causing their death. It is due to a minute parasite belonging to the so-called imperfect fungi, and is known as *Glœosporium venetum*. Its threads penetrate the tissues of the bark, and the early removal and destruction of the affected stems as well as the application of a strong solution of copper sulphate before the buds open in the spring, will reduce the disease. See BLIGHT.

Rutaba'ga. See TURNIP.

Ruta'ceæ, family of dicotyledonous trees, shrubs, and herbs. Rue, buchu, and the prickly ash (*Xanthoxylum*) are representative plants. Botanists have recently attached the *Aurantiaceæ* (orange, lemon, citron, etc.) to this family, which numbers nearly 800 species.

Rut'gers, Henry, 1745–1830; American soldier and philanthropist; b. New York City; officer in War of the Revolution; prominent member of the Reformed Dutch Church; active politician; several times member of the New York Assembly; a regent of the Univ. of New York, 1802–26. Rutgers (originally Queen's) College took his name in consequence of a donation of $5,000, and several important charities in New York City were recipients of his bounty.

Ruth, Book of (Hebrew, "appearance," "beauty"), a canonical book of the Old Testament. It is a beautiful pastoral story, relating the love of Ruth, a young Moabitess,

the widow of a Hebrew, for her mother-in-law, Naomi, and the subsequent marriage of Ruth to Boaz, a rich husbandman of Bethlehem-Judah. It is a picture of domestic virtue and happiness amid the troubled times of the Judges, when might was right. Ruth was the great-grandmother of King David. The date and authorship of the book must be inferred solely from its contents and from its position in the canon. It has an Aramaic tinge, and in the Hebrew bibles is classified as one of the five little rolls of the Hagiographa; and from these facts some have inferred its post-exilian origin. English Bibles, however, following the Septuagint, place it as one of the five consecutive stories of the times of the Judges (Jud. xiii, 2–xvi; xvii–xviii; xix–xxi; Ruth; 1 Sam. i–iv, 1, first clause), and such testimony as that of Josephus and Origen shows that this is the more ancient classification.

Ruthe'nian Rite, branch of the Roman Catholic Church, consisting of the United Greeks of Austria, Hungary, and Poland, who, as a rule, speak the Russniak language. They have in Austria an archbishopric (Lemberg, with two united sees of Sanok and Sambor) and two bishoprics (Przemysl and Stanislawów). Their number is 2,653,567. They have 2,376 priests, who care for 1,535 parishes. In 1830 the Ruthenians of Russian Poland were separated from the Roman Church.

Ruthenians, Russniaks, or **Red Russians,** Russian inhabitants of the former Austria-Hungary, some 3,500,000 in number, who are usually classed with the Little Russians, from whom they are distinguished by a few slight differences of dialect. Most of them are found in E. Galicia and the Bukovina, but about 400,000 are settled on the other side of the Carpathians, in N. E. Hungary. Owing to their long subjection to Poland they are chiefly a nation of peasants, as the aristocracy is Polish or Polonized. They are intelligent, quiet, and peaceful, but backward in civilization. As a rule they belong to the United Greek Church, but their political sympathies are apt to be with their brethren in Russia. Their literature, like the Little Russian, of which it forms a part, is particularly rich in folklore and songs.

Ruthe'nium, metal discovered in association with native platinum, 1846; occurs chiefly in the hard grains of iridosmine in small proportion, not above six per cent. Next to osmium it is the most infusible known metal. It forms three chlorides, six oxides, and two sulphides; fumes not poisonous.

Ru'tile, native oxide of titanium used to color porcelains and artificial teeth yellow; is widely distributed, but only in small amount; often penetrates quartz in bladelike or needlelike crystals, and is then called Venus's-hair stone, sagenite, or *flèches d'amour*; when compact can be cut into a gem, with a luster and color like cut black diamond.

Rut'land, capital of Rutland Co., Vt.; 55 m. SSW. of Montpelier; original town chartered by New Hampshire, 1761; settled 1770. During the Revolution Rutland was a fortified post on the great N. military road, two forts having been erected within its borders. It was made the chief town of the county 1781, and, 1784–1804, was one of the capitals of the state. The city is in a rich mineral region, and has become widely known through the extent and value of its marble deposit, which was early discovered, and has been successfully quarried since 1830. In 1886 a division of the town was made, and the new towns of W. Rutland and Proctor were erected and set off. By this action and by the subsequent creation of the city in 1892 four separate municipalities were formed. As a result of these changes the marble quarries all came within the boundaries of the new towns, but the manufacture of marble and of quarrying and channeling machines is still carried on in the city to a considerable extent. There are also lumber and brickyards, manufactures of machinery, engines, and boilers, dairy and cheese factory apparatus, sugar evaporators, doors, sashes, blinds, and scales. The public buildings include the U. S. courthouse, the post office, the county courthouse, the city hall, Memorial Hall (cost over $60,000, besides the expense of material contributed by the quarry companies), in memory of the soldiers of Rutland who fell in the Civil War, Baxter Memorial Hall, House of Correction, an opera house, and many handsome business blocks. Pop. (1910) 13,540.

Rut'ledge, Edward, 1749–1800; signer of the Declaration of Independence; b. Charleston, S. C.; began law practice in Charleston, 1773; elected to first Continental Congress, 1774; member of first Board of War (June, 1776), of committee to draft Gen. Washington's commission (1775), and to draw up first Articles of Confederation; also of that sent to confer with Lord Howe on Staten Island; commanded a company of artillery during the siege of Charleston, where he was taken prisoner, 1780; was eleven months a prisoner at St. Augustine; in legislature, 1791, when he drew up the act for the abolition of the rights of primogeniture; became U. S. Senator, 1794; Governor of S. Carolina, 1798.

Rutledge, John, 1739–1800; American jurist; b. Charleston, S. C.; brother of preceding; studied law in London; began practice at Charleston, 1761; member of the Stamp Act Congress at New York City, 1765, of the S. Carolina Convention of 1774, and of the Continental Congress, 1774–75; sat in S. Carolina Convention of 1776, and was chairman of the committee which drew up the state constitution; was president of the new government and commander in chief of the state; resigned, through dissatisfaction with the new state constitution, 1778; chosen governor with extensive powers, 1779; took the field at the head of the militia against the invaders; retired to N. Carolina on the fall of Charleston, May, 1780; accompanied the army of Greene until 1782, when he summoned the Assembly of N. Carolina, and afterwards retired from the governorship, and was elected to Congress; became Chancellor of S. Carolina, 1784; member of convention which framed the Federal Consti-

tution; appointed a Justice of the U. S. Supreme Court, 1789; resigned, 1791, to accept the Chief Justiceship of S. Carolina; appointed by Washington Chief Justice of the U. S. Supreme Court, 1795, and presided at the August term, but as he lost his reason shortly after, the Senate declined to confirm the appointment.

Rüt'li. See GRÜTLI.

Ru'tuli, people of ancient Italy, inhabiting the coast of Latium, where they built the city of Ardea. They figure conspicuously in the legendary fictions about Æneas, etc., but were subdued by the Romans before the overthrow of the monarchy, and are not mentioned in history after that time, with the exception of a notice found in the list given by Cato of the cities that took part in the foundation of the Temple of Diana at Aricia.

Ruyter (roi'tėr), **Michael Adriaanszoon van,** 1607–76; Dutch admiral; b. Flushing, Zealand; went to sea as cabin boy, 1618; captain, 1635; rear admiral, 1645. In the war between Spain and Portugal he sunk, 1647, an Algerine piratical squadron off the port of Salé, and distinguished himself still more in the war between Holland and England, 1652, and in the Danish service. In 1667 he sailed up the Thames, destroyed the shipping at Sheerness, and burned a number of English men-of-war; 1672, attacked the English and French fleets, and compelled England to conclude the Peace of Breda. In the war with France he commanded in the Mediterranean, but was defeated off the E. coast of Sicily by Admiral du Quesne. He succeeded in conducting his fleet safely into the harbor of Syracuse, where he died next day.

Rydqvist (rĭd'kvĭst), **Johan Erik,** 1800–78; Swedish scholar; b. Gothenburg; editor of a literary journal, *Heimdal* (1828–32); became royal librarian; elected to the Swedish Academy. His "Principles of the Swedish Language," five volumes, 1850–74, is still, in spite of the many changes in linguistics, the authoritative work on that subject.

Rye, cereal plant (*Secale cereale*), native of the country about the Caspian Sea; largely cultivated in central and N. Europe, where the grain is the chief breadstuff and the straw is largely used for thatching. Rye grows well in a cold climate, and will thrive on poor sandy soils better than wheat. Rye is not so nutritious as wheat, and makes an inferior and darker-colored bread. In the E. U. S. the straw is often of as much value as the grain. Machinery has been devised for threshing the grain without breaking the straw, which is used largely for matting, mattresses, and saddlery. Whisky is extensively distilled from rye in the U. S., gin in Holland, and a liquor called kvass in Russia. Production in U. S., 1911, 33,119,000 bu., valued at $27,557,000, from 2,127,000 acres; chief rye states in order of production: Wisconsin, Michigan, Minnesota, and Pennsylvania.

RYE.

Rye Grass (*Lolium perenne*), a European grass naturalized in the U. S. In Europe it is highly esteemed, both for hay and pasture, and is the most important of all forage plants, but in the U. S. it is not very highly valued. The Italian rye grass (*L. italicum*) is also greatly valued in Great Britain. For the *L. temulentum* see DARNEL.

Rye House Plot, scheme devised by some English Whigs to kill Charles II while on his way from Newmarket, and to give the crown to the Duke of Monmouth. It was so called from the Rye House, a farm near Newmarket, where the murder of the king was to be undertaken. The plot was discovered, and many leading Whigs, including Algernon Sydney and Lord Russell, were sent to the block, and many others were severely punished.

Ry'mer, or Rymour, Thomas, abt. 1641–1713; English historiographer; b. Northallerton, York; became historiographer to William III, 1692; now chiefly remembered for the vast Latin collections of English historical and diplomatic documents known as "Rymer's Fœdera" (twenty volumes, folio, 1704–35, of which fifteen were edited by himself and the remainder by Robert Sanderson). Rymer left fifty-eight MS. volumes of important historical documents, now in the British Museum.

Ry'mour, Thomas. See RYMER, THOMAS.

Ryswick (rĭz'vĭk), village of S. Holland, Netherlands, 2 m. SE. of The Hague. Louis XIV here concluded, 1697, a treaty of peace with Holland and other powers, in which he acknowledged William of Orange as King of Great Britain and Ireland, and restored his conquests in Catalonia and a large part of Flanders to Spain, and others on the Rhine, as well as Lorraine, to the German Empire; but Strasburg and other places in Alsace were definitely ceded to France.

S

S, nineteenth letter, fifteenth consonant, and chief sibilant in the English alphabet. It is a linguo-dental, and represents the hissing made by driving the breath between the end of the tongue and the roof of the mouth, just above the upper incisors. It is found in most languages, and is one of the most abundant consonants in English. Its sound varies, being strong, like c soft, in this, sun, and softer; like z in these, wise. See ABBREVIATIONS.

Saadia (sä'dē-ä), **ben Joseph** (known in Arabic literature as SAID IBN YAKUB AL FAYYUMI), 892–942; Jewish writer; b. Fayyum (Pithom), Egypt; was the first among the Jews to attempt an exposition of philosophy and theology from the standpoint of rabbinical Judaism.

Saale (sä'le), name of several German rivers; most important, the Saxon or Thuringian Saale.

Saar, a river of N. France, whose section called the Saar Basin, has long been noted for its extensive deposits of coal, and whose disposition after the World War was a serious problem before the Peace Conference. In the peace treaty, however, in compensation for the destruction of coal mines in N. France and as payment on account of reparation, Germany ceded to France the full ownership of the coal mines in the Saar Basin, with their subsidiaries, accessories, and facilities. The "basin" extends from the frontier of Lorraine, as re-annexed to France N. as far as Stwendel, including on the W. the valley of the Saar as far as Sarrholzbach and on the E. the town of Homburg. The value of this property will be fixed by the Reparation Commission.

Saarbrücken (zär'brük-ĕn), town of Rhenish Prussia, on the Saar; was the theater of the opening of the Franco-German War of 1870–71. On August 2, 1870, Napoleon III, at the head of a whole army corps and accompanied by his son, attacked the town, which was feebly garrisoned by the Germans, compelled the garrison to retreat, and marched into the town. Next day the French evacuated the place, and, August 6th, a violent encounter took place in the vicinity, the German army attacking the French position on the hills of Spichern SW. of the town. The French were defeated and forced to retreat across Eslingen to Blittersdorf, leaving many prisoners, their camp equipage, pontoons, and provisions. Pop. (1910) 105,089.

Sab'aka, Ethiopian who invaded Egypt, defeated and burned Bocchoris, the sole king of the twenty-fourth dynasty, and himself became the first king of the twenty-fifth dynasty. He is supposed to have been the So or Seveh of the Bible and the Shabe of the Assyrian monuments. His approximate date was 700 B.C., but the length of his reign is uncertain (twelve years according to the monuments; fifty years according to Herodotus ii, 137). His reign in Egypt was mild, and he left monumental remains in Thebes. Hoshea of Israel (II Kings xvii, 4) asked his aid against Shalmaneser of Assyria in vain, and later other Syrian princes made alliance with him against Assyria. Sargon, who defeated Sabaka at Raphia, S. of Gaza, and afterwards exacted tribute of him, calls him a "prince," and his cartouche, found at Nineveh, shows him wearing the crown of lower Egypt. Stade considers him to have been simply a petty local ruler.

Sa'bal Palmet'to. See PALMETTO.

Sab'bath (Hebrew, *shabbath*, day of rest), the seventh day of the week among the Hebrews, dedicated to an entire cessation from worldly labor. It began on Friday evening, and extended to the evening following. The great majority of Christians celebrate the first day of the week, Sunday, instead of the seventh; but a few small denominations adhere to the religious celebration of the seventh day. The observance of a weekly rest day is widely held to have a natural basis in the constitution of man. The persistency with which such an institution has been maintained for many ages among Jews, Christians, Mohammedans, and even some pagan nations, supports this view. Inquiries instituted by a commission of the British Parliament, 1832; the testimony of 641 medical men of London in a petition to Parliament, 1853, and of a great number of medical societies, physicians, physiologists, political economists, and managers of industrial establishments, go to prove that in the case of men engaged in ordinary bodily or mental labor the rest of the night does not fully restore the waste of energies during the day, and that to maintain a condition of vigor a supplementary rest of about one day in seven is needed. This view is confirmed by the experience of France during the Revolution, when the decade was substituted for the week, and each tenth day devoted to rest—a proportion of time which was found to be insufficient. The need of a weekly respite from daily toil appears also in the social nature and relations of man as a member of the family and of the state. These aspects of the weekly rest have been ably illustrated in papers presented at the Sunday Rest Congress in connection with the Paris Exposition of 1889, and at the Chicago Sunday Rest Congress, 1893. See LORD'S DAY.

Sabbat'ical Fes'tivals, four festivals enjoined by the laws of Moses. These were: (1) The Sabbath day. (2) The Sabbath month, Tisri, the seventh in the Hebrew year, corresponding to October. It opened with the Feast of Trumpets, contained the Day of Atonement (10th), and the Feast of Tabernacles (15th to 22d). (3) The Sabbath year, which in Exodus (xxiii, 10, 11) has an agricultural aspect (the land is to rest from culture); in Deuteronomy (xv, 1, 2) has a commercial aspect (debts were either to be relinquished or held in abeyance); and in Leviticus (xxv, 3–7) a religious aspect ("for the Lord"). Every seventh year was thus interdicted to secular and selfish uses; but before the Babylonian captivity the ordinance appears not to have been well observed (Jer.

xxv, 11, 12, compared with II Chron. xxxvi, 21). After the Captivity it was different. Alexander, who conquered Syria 332 B.C., remitted the tribute of the Jews every seventh year. Julius Cæsar afterwards did the same. (4) The Year of Jubilee, which was not, as some say, every forty-ninth, but every fiftieth year, so that there were then two successive years of rest. In that year every Hebrew servant was to regain his freedom, and landed property to revert to the representatives of its original proprietors.

Sabel'lius, b. abt. 180 A.D.; African ecclesiastic; b. probably Ptolemais; was active in Rome until his excommunication by Pope Calixtus abt. 217 A.D.; turned up later in Egypt, and was again excommunicated by Bishop Dionysius of Alexandria (260). The heresy which bears his name, called Sebellianism, is essentially the same as that styled Patripassianism in the Western Church. It teaches that the trinity of the Godhead is not a trinity of persons, but of manifestations and periods in the history of revelation. God is strictly one in person, but reveals himself in a threefold aspect as Father, Son, and Holy Spirit in the works of creation, redemption, and sanctification.

Sa'bianism, or **Za'bism,** religious system of the Sabiün (Baptists), a Christian sect in Mesopotamia and N. Arabia who adhered to much of their original nature worship, but were known chiefly for their frequent washings. For this reason they have been wrongly identified with the Mandeans (*q.v.*), with other sects in S. Babylonia, and with a certain Samaritan sect. They are, perhaps, the same as the Elkasaïtes. Mohammed and his first followers were called Sabians by the heathen Arabs. Mohammed had only a vague idea who they were, but in the Koran mentions them favorably together with Jews and Christians. Under Al-Ma'mun, 830 A.D., the inhabitants of Harran, whose religion was a fusion of heathenism and Neoplatonic ideas, but who still worshiped stars and offered sacrifices, shielded themselves by declaring that they were the Sabians mentioned in the Koran. They even asserted that they were descendants of one Sabi, son of Seth or Adam.

Sa'bians, or **Sabæans,** tribe of Saba, anciently inhabiting Yemen, the SW. corner of the Arabian peninsula. Abt. 1100 B.C. they became of importance, and, abt. 900 B.C., their princes, who took the title of Kings of Saba, supplanted the Mineans, the dominant tribe of Arabia. During the period 400 B.C. to 300 A.D. the Sabian rulers subdued the Himyarites and Abyssinians, and drove the latter to Africa. In the period 300–600 A.D. the title of King of Saba, Dhu-Raidan, Hadramaut, and Yemen was borne by the monarchs. The Abyssinians made two attempts to reoccupy Saba, but were finally driven out toward the end of the sixth century by the Persians, who had been contending with Rome for possession of Arabia. The appearance of Mohammed put an end to the quarrels, and for a time united the whole peninsula. About 1,600 Mineo-Sabian inscriptions have been found. They are written in a dialect akin to the Arabic and Ethiopic, and in a script which is the parent of Ethiopic.

Sabine (săb'ĭn), **Sir Edward,** 1788–1883; British physicist; b. Dublin, Ireland; entered army, 1803; took part in the campaign on the Niagara frontier, commanding the batteries at the siege of Fort Erie, 1814; accompanied the Arctic expedition of Ross and Parry, 1818, and that of Parry, 1819–20, when he made important researches in terrestrial magnetism, communicated to the Royal Society; made a series of voyages, ranging from the equator to the Arctic Circle (1821–25), in quest of data concerning the variations of the magnetic needle, the figure of the earth, and other problems in meteorology and terrestrial physics; published "An Account of Experiments to Determine the Figure of the Earth" and "The Variability of the Intensity of Magnetism upon Many Parts of the Globe"; edited the records of magnetic observations made at Cape Town, Toronto, St. Helena, Hobarton, and other colonial observatories in several large volumes (1843–60); Knight of the Bath, 1869.

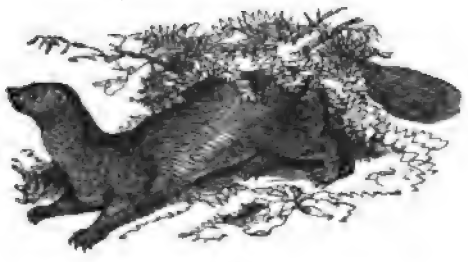
Sabine (să-bēn') **Riv'er,** stream which rises in Hunt Co., Tex., flows SE. to the W. boundary of Louisiana, and then turns S., forming throughout the rest of its course the boundary between Texas and Louisiana for 250 m.; is 500 m. long, navigable in its lower course, and after traversing Sabine Lake enters the Gulf of Mexico through Sabine Pass, its mouth.

Sabines (să'bĭnz), ancient inhabitants of a tract of central Italy E. and N. of Rome. They were a confederation of communities, of which Cures maintained a sort of headship, the most important other places being Reate and Amiternum. As a people the Sabines were engaged in agriculture and grazing, and, from the simplicity of their life and their physical prowess, they obtained a reputation like that of the Spartans for severity of discipline and sturdiness of character. They were not finally subdued by Rome until 290 B.C., and some twenty years later they were admitted to citizenship.

Sabi'nus, Masurius, famous jurist of the reign of Tiberius, pupil of Capito, and founder of the school of Sabiniani; author of several works, the most important being "Libri iii, Juris Civilis," which was much used and commented on by later jurists, but is not extant.

Sa'ble, species of the family *Mustelidæ* and genus *Mustela.* The animals in external appearance resemble the weasel, but are larger and their bodies are not so elongated. In summer the color is reddish or brownish yellow, clouded with black, and becoming lighter toward the head; in winter it is dark. The length of the body in well-grown sables does not vary much from 17 in. from the snout to the tail, while the tail is from 7 to 10 in. long. The Old World form (*M. zibellina*) inhabits N. Europe and Asia. The sable furs are chiefly obtained in Siberia. This Siberian form in winter often has the whole body covered with lustrous blackish-brown or sometimes quite

black hairs, but with these are generally intermingled white ones. The American sable (*M. americana*) is most abundant in British



SABLE.

America, and the furs in the markets are chiefly obtained by the Hudson Bay Company.

Sable Is'land, island 104 m. SE. of Cape Canso, Nova Scotia; a dependency of Nova Scotia; is an arc 34 m. long, convex to the S., and from 1¼ to 5 m. in breadth; composed of grass-covered sand hills, inclosing a lake 11 m. long with a maximum depth of 12 ft. Many ponies are bred here. The island has a life-saving station, it being surrounded by extensive and very dangerous shoals.

Sabri'na, celebrated temporary volcanic islet of the Azores, a short distance SW. of Cape Ferraria, the W. point of San Miguel Island. It appeared, 1811, and the process was watched by the crew of the British frigate *Sabrina*, from which its name is derived. Sixteen days after the eruption the cone attained its greatest dimensions—215 ft. in height and 6,000 in circumference. It was composed of ashes and scoria without cohesion, and was gradually washed away until, 1850, the lead showed a depth of 15 fathoms, where it had formerly stood.

Sac. See FOXES.

Saccharin (săk'kă-rĭn), crystalline compound first obtained in 1887 from coal tar. Its chemical name is ortho-benzo-sulphon-amide. Its practical value lies in its extreme sweetness—about 300 times stronger than cane sugar, and one grain of saccharin will give a distinctly sweet taste to 70,000 grains of water. It is largely made in Germany, and used in confectionery and baking. It is given to patients suffering from diabetes, as ordinary sugar would aggravate the disease.

Sacchini (săk-kē'nē), **Antonio Maria Gasparo,** 1734–86; Italian composer; b. Pozzuoli; achieved a great success at Rome, 1762, by his opera, "Semiramide," and at Venice, 1768, by his "Alessandro nell' Indie"; after composing about fifty operas for Italian theaters, went to Germany, 1771; repaired next year to London, where he was very successful with his operas; settled in Paris, 1782, but only one of his operas, "Œdipe à Colone," performed after his death, made any great impression.

Saccomy'idæ, family of mouselike rodents peculiar to N. America; distinguished by the hind limbs being much longer than the fore, and hence adapted for leaping. The species are confined to the W. and S. portions of the U. S. and middle America. They vary in size, some being smaller than the ordinary house mouse, while others are nearly as large as a rat. They progress chiefly by long leaps, in the fashion of the kangaroo or ordinary jumping mice.

Sacculi'na, genus of root barnacles often mentioned as an instance of degeneration.

Sacher-Masoch (să'chĕr-mă'sŏch), **Leopold,** 1835–95; Austrian novelist; b. Lemberg, Galicia; was teacher of history at Gratz; settled in Vienna, devoting himself to literature; published a great number of novels, of which especially the series, "Cain's Inheritance," attracted much attention.

Sacheverell (să-shĕv'ĕr-ĕl), **Henry,** abt. 1672–1724; English clergyman; b. Marlboro, Wiltshire; delivered two political sermons, 1709, in which he maintained the doctrine of passive obedience, and denounced the act of toleration. The Whigs being then in power, he was ordered to be impeached, and the trial began before the House of Lords, February 27, 1710. On March 23d he was found guilty, and sentenced to three years' suspension from preaching, and the two sermons were ordered to be burned. At the expiration of his sentence the House of Commons, then Tory, appointed him to preach before them on the Restoration day, and the queen presented him to a living in London.

Sachs (säks), **Hans,** 1494–1576; German poet; b. Nuremberg; was a cobbler, and produced, it is said, 6,000 poems of all kinds, only about one fourth of which are in print, including 53 sacred and 78 profane plays, 64 farces, and 59 fables. Many of his comedies are full of coarse, strong satire on the times.

Sack'but, wind instrument somewhat resembling the trumpet, having a slide like the modern trombone; is mentioned in the Book of Daniel, but the translation is probably wrong, the English sackbut being a very different instrument, derived from a model found at Pompeii.

Sack'etts Har'bor, village in Jefferson Co., N. Y.; on Black River Bay; 8 m. E. of Lake Ontario; has an excellent inner harbor, with sufficient depth of water to accommodate the largest vessels, good water power for manufacturing, and agricultural surroundings. The *Oneida*, the first U. S. war vessel ever launched on Lake Ontario, was built here, 1809. In the war with Great Britain (1812–15) the village was an important naval station. Two war vessels, the frigate *Superior* and the *Madison*, were built here in eighty and forty-five days respectively from the time the timber was cut. A third warship, partially completed when peace was declared, remained on the stocks, and was for many years an object of local pride. The U. S. Govt. has a military station here, known as Madison Barracks. Pop. (1910) 868.

Sack'ville, George Germain (Viscount), better known as LORD GEORGE GERMAIN, 1716–85; English soldier and statesman; son of first

Duke of Dorset; was in battles of Dettingen and Fontenoy; served under the Duke of Cumberland against the Young Pretender, and became lieutenant general. In 1775, under the name of Lord George Germain, he entered the cabinet of Lord North as Secretary of State for the Colonies, retaining the office during the American Revolutionary War, and incurring great unpopularity by his opposition to efforts for the termination of hostilities.

Sackville, Lionel Sackville West (Baron), 1827–1908; British diplomatist; b. Bourn Hall, Cambridge, England; entered diplomatic service, 1847; minister to Argentine Republic, 1873; Spain, 1878; to the U. S., 1881; represented Great Britain in the Washington Conference on Samoan Affairs, 1887; negotiated Fisheries Treaty of Washington, 1888; having become a *persona non grata* on account of a letter written by him to a Mr. Murchison in advocacy of the reëlection of Pres. Cleveland, 1888 (on the ground that it would be to the advantage of Great Britain), he received his passports from the U. S. Govt. and returned to England.

Sackville, Thomas. See DORSET, THOMAS SACKVILLE.

Saco (sā'kō) **Riv'er,** stream which rises in the White Mountains, N. H., and flows SE. 160 m. through New Hampshire and Maine to the Atlantic; has several considerable falls, one of which, Great Falls, is 72 ft. in height, and furnishes water power, utilized at many places for manufactures.

Sac'rament, in Christian theology, an external ordinance or rite of divine institution, significant of a supersensual grace or spiritual effect. Both the Greek and Latin churches believe that there are seven such sacraments, *viz.*: baptism, confirmation, penance, the eucharist, extreme unction, order or ordination, and matrimony. Baptism, confirmation, and ordination can only be received once, and are considered to impress on the soul an indelible seal or character. Protestants generally believe in but two sacraments, baptism and the Lord's Supper, on the ground that the New Testament mentions only these as having been instituted by Christ.

Sacramenta'rians, epithet applied to the followers of Zwingli by the Lutherans in Reformation times because the former denied the presence of the body and blood of Christ in the eucharist, and affirmed that the consecrated elements were mere symbols. The Calvinists later came in for the same designation, although approaching much nearer the old Church doctrine.

Sacramen'to, capital of State of California and of Sacramento Co.; on the Sacramento River at its junction with the American; 50 m. N. of Stockton; at head of navigation for large steamers, although vessels ply between points 100 m. N. The city has an area of about 2½ sq. m., is built on a plain 30 ft. above sea level, and laid out in rectangular blocks, and is protected from overflow by levees. The climate is semitropical, tempered by cool breezes in summer. Capitol Park (twenty acres) is maintained in excellent order by the state, and there are other city and two private parks. The state capitol, built of granite, brick, and iron at a cost of $2,500,000, is the most conspicuous building. Sacramento has a number of manufactories and several large canneries and packing works. The chief industrial plant comprises the shops of the Southern Pacific Railroad Company, employing from 2,000 to 3,000 men in car and machinery construction and repairing. The city is the largest and chief fruit-shipping center of the state. The dryness of the atmosphere, centrality of location, various lines of railway, and river transportation advantages make it a commercial center for the whole great valley region. Sacramento was first known as a small trading post called New Helvetia. The settlement was made and controlled by Capt. John A. Sutter, who, 1839, secured a grant from the Mexican Govt. for land in and adjacent to the present city. The discovery of gold by James W. Marshall while digging a mill race on American River at Coloma, 60 m. away, brought 100,000 immigrants to the city in a single year. The first building was erected 1849, and the city became the state capital, 1854. The city has suffered severely—twice by fire and twice by flood. After the inundation of 1860 the principal streets were raised 8 ft. and the levees strengthened. Pop. (1910) 44,696.

Sacramento Riv'er, stream which rises in N. California; flows S., and empties into an arm of San Francisco bay; drains the N. portion of the great valley of California lying between the Sierra Nevada and Coast Range; only outlet for waters of this vast basin is through the Golden Gate. S. of Mount Shasta the Sacramento joins Pitt River, the longer and larger stream, and should properly bear the name of the main trunk. The length of the Sacramento is about 400 m.; navigable to Red Bluff, 275 m., but in recent years steamboats have not gone above McIntosh landing, 45 m. below.

Sa'cred Heart, La'dies of the, order of nuns founded, 1800, in France by J. D. Varin, a Jesuit, and Magdalen Sophie Louise Barat; approved by the pope, 1826; established in the U. S., where there are now many houses, 1818. There is also an order of Sisters of the Sacred Agonizing Heart of Jesus, with a few houses in the U. S.

Sac'rifice, offering to the Deity, as an expression of thanksgiving, penitence, or consecration. The earliest records, sacred and profane, show sacrifice as an existing institution, and as receiving the Divine approbation. The object was everywhere the same—to provide a means whereby man might approach God. The chief kinds of Hebrew sacrifices were the whole burned offering, which was wholly consumed on the altar, and with which an oblation of fine flour and oil, with incense, and a drink offering of wine were offered; the sin offering, of which only the fat and kidneys were burned upon the altar, the flesh being either "burned without the camp" in case the blood had been sprinkled within the sanctuary, or eaten by the priests alone in case the blood had been only

sprinkled on the brazen altar; and the trespass offering. These were all propitiatory offerings, and with them the priest was required "to make atonement" for the people. Besides these were the peace offerings, perhaps the most common of all.

There were other important sacrifices required. Such were the Passover lamb offered in memory of the deliverance from Egypt by each head of a family on the 14th of the month Nisan in each year, and eaten in their homes on the following night; the two goats on the great Day of Atonement in each year, of which one was sacrificed at the altar, the other sent as a "scapegoat" into the wilderness; the red heifer, burned without the camp and its ashes used in purification; and a great variety of sacrifices for individuals on special occasions. Under the Levitical law the essential point of the sacrifice was the blood, the treatment of which always formed the culminating point in the sacrificial ritual. A burned offering of a lamb for the whole people was offered every morning and evening, with its accompanying oblation or "meat offering." To bring the sin offering within the reach of all, it was provided that for the required animal might be substituted by the poor a pair of doves, or even in case of extreme poverty an offering of flour. The symbolical significance of the sacrifices are set forth in the Epistle to the Hebrews.

Sacs, or Sauks, tribe of N. American Indians, belonging to the Algonquian family; formerly living on the Detroit River and Saginaw Bay, whence they were driven beyond Lake Michigan by the Iroquois. They were roving and restless, constantly at war with the Sioux and the Iroquois, and aided the French against the latter; took part with Pontiac, and during the Revolution were under English influence; in the second war with England the Rock River Sacs joined the English side. Treaties were made with the tribe, 1804 and 1815–16, ceding lands. They have been closely associated with the Foxes. The remnant of the tribe are now settled in Kansas (Sac and Fox of Missouri), Iowa (Sac and Fox of Mississippi), and Oklahoma (Sac and Fox of Mississippi), and number less than 1,000.

Sa'crum ("the sacred bone"), in the vertebrate skeleton, a bone situated below or behind the lumbar and above or before the coccygeal vertebræ. In man it is formed of five united vertebræ. It is large, roughly triangular, and is penetrated by holes for the passage of nerves. The rabbins called it luz, and said that it never decays, but forms the germ of the new body at the resurrection; the Arabs say that the judgment angel sits upon it and judges the soul of the departed.

Sacy (sȧ-sē'), **Antoine Isaac** (Baron Silvestre de), 1758–1838; French Orientalist; b. Paris; elected to Académie des Inscriptions, 1785; Prof. of Arabic at the École des Langues Orientales; called to the Institute (section of literature and fine arts), 1795, but did not take his place till 1803; Prof. of Persian at Collège de France, 1805; represented Paris in the Corps Législatif, 1805–15; created baron, 1813; administrator of Collège de France and the École des Langues Orientales, 1822; entered Chamber of Peers, 1832; conservator of Oriental MSS. of the Bibliothèque Nationale and perpetual secretary of Académie des Inscriptions, 1833.

Sad'dle, contrivance designed to rest on the back of an animal and serve as a seat for a rider or as a support for other weights. It thus includes the pack saddle and the part of a single harness that supports the weight of the shafts. The pack saddle varies in form, but that most used consists of crossed sticks, like a common sawhorse, securely fastened to saddle bars of long bearing. The use of riding saddles is of ancient origin. Pancirollus relates that Constantine the Younger was killed 340 by falling from his saddle, and the Emperor Theodosius, 385, forbade the use on post horses of saddles weighing over 60 lb. Riding saddles are of two types, Hungarian and Moorish. The original of the former consisted of wide parallel bars, joined at the ends by heavy bows, to which were secured parallel strips of hide. There were no stirrups. The Hungarian saddle of the present closely resembles the primitive one, while the English saddle is the most highly developed form of the type in Europe, and the McClellan saddle (named after Gen. G. B. McClellan) the best in the U. S.

The Moorish type probably originated in Persia. In the primitive form a number of skins were superimposed on the animal's back, with a front and back wooden cantle, the whole confined by straps completely surrounding the animal. In the construction of its various forms the finest fabrics have been employed, and it has always been the most expensive saddle made. Mexican, Texas, and California saddles are derived from this type, retaining the main features of the original. Ladies' saddles originated with the pillion, which was nothing but a well-stuffed cushion or pad, with dependent strap foot rest and an iron back, to which the rider was fastened by a strap encircling the waist. The Icelandic saddle was an improvement on this, and partook more of the nature of a chair, the pad being built on bars, something like a man's saddle. The pommel and cantle were added to the saddle in England in early times. The present type of side saddle seems to have come into vogue abt. 1680. It is said Anne of Bohemia introduced the saddle into England, 1380. The third pommel, or leaping horn, appeared abt. 1830, and by the firmer grip given at once eliminated much of the danger in woman's riding. At present the off-side pommel is merely a slight projection.

Sad'ducees, name of a Jewish sect, derived according to a Jewish tradition from Zadok, its reputed founder, in the third century B.C. The Sadducees appear in history for the first time under the Maccabean Jonathan, abt. 144 B.C. They acknowledged only the written law, held that the soul dies with the body, denied providential interference, and made all human actions solely dependent on the free will of men. Toward the close of the existence of the Jewish state they were excluded from Judaism, and gradually disappeared; but some of their principles were revived by the Karaites.

Sa'di. See SAADI.

Sad'ler, Sir Ralph, 1507–87; English statesman; b. Hackney; Henry VIII employed him in the dissolution of the religious houses, and named him in his will one of twelve councilors to the sixteen nobles to whom the care of the kingdom was entrusted. Under Elizabeth he was a privy councilor and keeper of Mary, Queen of Scots, in the castle of Tutbury. His "State Papers and Letters" were edited by Arthur Clifford, with a memoir and notes by Walter Scott (1809).

Sado (sä'dō), island in Sea of Japan; about 30 m. from the Japanese mainland; forms part of the prefecture of Niigata; possesses gold, silver, copper, and lead mines; chief town, Aikawa; pop. abt. 115,000.

Sadoleto (sä-dō-lā'tō), **Jacopo,** 1477–1547; Italian cardinal; b. Modena; ordained in Rome, 1502; appointed secretary to Leo X, 1513; made Bishop of Carpentras, France, 1517; cardinal, 1536; made a favorable impression even on the most zealous reformers by his conciliatory spirit, and was often employed in the diplomatic negotiations between Charles V, Francis I, and the popes.

Sadowa (sä-dō'vä), village of Bohemia; on the Bistritz; 9 m. NW. of Königgrätz; name given by the Austrians to the battle of Königgrätz, in which, July 3, 1866, 240,000 Prussians defeated 220,000 Austrians and Saxons; Prussian loss was 9,000 men, while the Austrians lost over 40,000 men in killed, wounded, and prisoners.

Safed', town in Palestine, in ancient province of Galilee (altitude, 2,749 ft.), with splendid view of Jebel Zebut, Jebel Jermak, Tabor, and Carmel; thought by some to be mentioned in Matthew v, 14. A fortress was built there by Fulke, 1140, defended by the Templars; taken by the Sultan of Damascus, 1220; reconstructed by the Templars, 1240; taken definitely by the Moslems, 1266, and made capital of a province. In 1799 it was occupied by a French garrison. Jews settled there in large numbers in the sixteenth century, expecting that the Messiah would make it his capital.

Safes, structures designed to protect papers, money, or other contents from loss either by theft or by fire. Fireproof safes are usually surrounded by a filling of nonconducting material like clay or concrete, or by plaster, alum, or other salt capable of giving off water when subjected to great heat. A fireproof safe should, if possible, be imbedded in brickwork, which greatly obstructs the transmission of heat.

Burglar-proof safes are of two distinct constructions: 1. Those which have walls cast in one mass of iron or steel or of some alloy of these metals. 2. Those having their walls built up of bars or plates of iron or steel secured together by bolts or rivets. The first class may be subdivided as follows, *viz.*: (*a*) Safes in which the resistance to attack depends upon their form, and the extreme hardness and toughness of the cast metal used. Such are the spherical safes made from an alloy of iron and chromium. (*b*) Safes having the cast metal of their walls reënforced by a network of wrought-iron or steel rods, about which the molten iron or steel is poured, and which is solidly inclosed by the cast metal when it cools. The second class may also be divided in the following way, *viz.*: (*c*) Safes made of bars or plates of homogeneous wrought iron or steel. (*d*) Safes in which the bars or plates are composed of layers of iron and steel welded together. (*e*) Safes made of layers of bars or plates of wrought iron or steel, between which are interposed one or more layers of bars of hard cast iron. The doors of the best modern safes are fitted with the greatest accuracy in order to prevent the introduction of explosives.

Apertures through the doors of safes for the passage of spindles for operating bolts and locks have been found a source of insecurity, and therefore doors for burglar-proof safes have been contrived so that when shut they are fastened by bolts operated automatically, and they are provided with clockwork which can be so adjusted before the door is closed that at a certain hour the bolts are drawn by the release and action of powerful springs.

Safe'ty Lamp, lamp so constructed as to be safely employed in an atmosphere so contaminated with fire damp as to explode when a naked flame is exposed to it. Between 1812 and 1816 several forms of safety lamp were devised, that of Sir Humphry Davy being the best. Davy discovered that in a quiet atmosphere a mere partition of wire gauze is enough to prevent the transmission of flame, the gauze absorbing and radiating enough heat to reduce the temperature below the ignition point. To a small, cylindrical oil lamp he attached a cylinder of iron-wire gauze about 6 in. long and less than 2 in. in diameter, which inclosed the flame. It was supported in a framework of small metal rods fitted into terminal flat brass rings. One of these inclosed the body of the lamp, while the other was covered with gauze and served for attachment of a handle. The meshes of the gauze permitted free access of air to the flame and transmission of part of its light.

DAVY'S SAFETY LAMP.

When such a lamp is carried into an atmosphere contaminated with from three to six per cent of fire damp, the flame becomes elongated and smoky, being surrounded by a zone of mixed gases less rich in oxygen than air is, and containing carbon and hydrogen, both of which are combustible. The flame therefore occupies an appreciably larger volume, and indicates the approach of danger before an actually explosive atmosphere is reached. Modifications of the Davy lamp, such as Mueseler's, have come into use, chiefly with a view to surrounding the flame with glass so as to increase the effective radiation of light; but in each case access and egress of air are effected through one or more thicknesses of wire gauze. Recent improvements in the safety lamp have all been directed with a view to its use as a fire-damp indicator.

Safety Valve. See STEAM BOILER.

Saf'flor. See COBALT.

Saf'flower, dyeing material, the florets of *Carthamus tinctorius*, also called bastard and dyers' saffron, and in the U. S. incorrectly saffron. The plant is an annual, 1 to 3 ft. high, with spiny leaves, and dark orange flowers in thistlelike heads with a prickly involucre. The principal supply is from the E. Indies. The chief use of safflower is as a dye,

SAFFLOWER.

and before the introduction of aniline colors it was largely employed to impart to silk shades of pink, rose, crimson, and scarlet. It contains a yellow coloring principle, which is soluble in water and of no value, and a red coloring matter, carthamine or carthamic acid, which is insoluble in water, but soluble in alkaline liquids, from which it is precipitated by acids. The pink saucers, sold for dyeing and for toilet purposes, are small white saucers with a thin coating of carthamine. Rouge is also prepared from it.

Saf'ford, Truman Henry, 1836–1901; American mathematician; b. Royalton, Vt.; while a child attracted public attention by his remarkable powers of calculation; could mentally extract the square and cube roots of numbers of nine and ten places of figures, and at fourteen produced the elliptic elements of the first comet of 1849. At this time he was widely known as the Vermont boy calculator. He graduated at Harvard, 1854, and, 1863–66, was connected with the observatory. In 1865 he became Prof. of Astronomy in the Univ. of Chicago and director of Dearborn Observatory; 1876, professor of same in Williams College; after 1872 was much employed in latitude and longitude work for the U. S. Govt.

Saff'ranine, Safranine, An'iline Pink, or **New Rose,** dye which has to a large extent superseded safflower for dyeing silk and cotton, obtained by treating a mixture of toluylene diamine and toluidine with an oxidizing agent. For dyeing, the saffranine is dissolved in boiling water and carefully filtered, and a very little sodium carbonate added before it is put in the dye back.

Saf'fron, drug consisting of the dried stigmas of *Crocus sativus*. The plant resembles the spring-flowering garden crocus, but blooms in autumn. Saffron is mentioned by Solomon (Canticles iv, 14), and has been known and cultivated from very early times, so that its home is doubtful. The principal production of the drug is in lower Aragon and other parts of Spain; much excellent saffron is gathered in the department of Loiret, France; some is produced in Austria, and a small quantity is cultivated by Germans in Lancaster Co., Pa. The drug has always borne a high price, on account of the labor required to collect the small stigmas which compose it, and has been subject to various adulterations. Saffron was formerly a favorite dye, but is now rarely used as such. It is employed in medicine for coloring tinctures and for liqueurs, varnishes, confectionery, and especially cakes in the west of England.

Saf'ranine. See SAFFRANINE.

Saga (sä'gä), city of Kiushiu, Japan; province of Hizen; at head of bay of Shimabara; 50 m. NE. of Nagasaki; is principal seat of the trade of Kiushiu, and manufactures the famous Hizen porcelain ware; was the former capital of the Prince of Nabeshima, one of the eighteen semi-independent daimios. Pop. (1903) 35,083.

Saga, literary prose form peculiar to Iceland. The sagas are divided into *Icelandic family sagas*, which rehearse the deeds of the member of the family who first settled in the country, and sometimes also relate the fate of his descendants; Scandinavian, chiefly Norwegian, *historical sagas*, having for their subject the history of Scandinavian countries; *legendary and mythical sagas*, some of which treat of the myths of the Nibelungen cycle; to these should be added the *romantic sagas*, translations and adaptations of romances of English, French, or German origin. If the hero of the *family saga* happens to be a scald, a poet, then the prose narrative is interspersed with his poems. Most of the *family sagas* are preserved in MSS. of the thirteenth and fourteenth centuries. The *romantic sagas* date from the last two centuries of the mediæval period.

Sagar, or **Saugor** (sä-gŭr'), island in the delta of the Ganges, at mouth of the Hugli; 23 m. long N. and S., and 2½ to 8 m. broad; celebrated as a station for Hindu pilgrims. It has few permanent inhabitants, but is visited annually, in January, by from 100,000 to 200,000 pilgrims. The celebration attended by them lasts only three days, but a certain proportion remain for weeks to take baths. The island contains a meteorological observatory, a lighthouse, and telegraph station.

Sagas'ta, Práxedes Mateo, 1827–1903; Spanish statesman; b. Torrecilla de Cameros; elected to the Constituent Cortes, 1854; took part in the insurrection of 1856, and fled to France; returned to Spain on proclamation of amnesty; became professor in School of Engineers in Madrid, and editor of *La Iberia*, organ of the

Progressist party; after unsuccessful insurrection of June, 1866, again fled to France, but returned on fall of Queen Isabella II; member of Gen. Prim's first cabinet; Minister of State, January, 1870; declared for the monarchy; Minister of State in the first cabinet of King Amadeus; successively Minister of Foreign Affairs, Minister of the Interior, and President of Council, 1874, under Serrano; gave in his adherence to Alfonso XII, 1875; joined the new Liberal party, 1880; came into power at the head of a coalition, 1881, which was superseded, 1883, by a cabinet formed from the dynastic left. On the death of Alfonso XII, November 23, 1885, he again took charge of the government; 1890, was succeeded by Cánovas; was in power, 1893–95; again succeeded by Cánovas; October, 1897, two months after the death of Cánovas, again took charge of the government; resigned, 1899; again assumed government, 1901, resigning 1902.

Sage, Alain René Le. See LESAGE.

Sage, name given to species of *Salvia*, of the labiate family, and especially to the common or garden sage, *S. officinalis*. There are two native species in the middle U. S., four others in the S., and several others in the far W. and SW. states. The garden sage, the best-known

GARDEN SAGE.

species, is a hardy, half-shrubby plant from the S. of Europe, with a peculiar aromatic odor and a warm and bitterish taste. It has been used medicinally since very early times; besides being an aromatic stimulant, it has tonic and astringent properties, and its infusion is frequently given in domestic practice; it is a useful gargle in relaxed sore throat. But its chief use is as a condiment or seasoning for stuffings, sausages, and other cookery; and it is sometimes used to flavor cheese. Clary is a species of sage (*S. sclarea*), with much larger leaves than the common, with a strong and to many persons unpleasant flavor; it is rarely seen in U. S. gardens, but is used in Europe for flavoring soups. The scarlet sago, *S. splendens*, from Brazil, is a common garden plant, usually called by its botanical name, *Salvia*.

Sage Brush, popular name of species of bitter shrubs of the genus *Artemisia* (family *Compositæ*) growing on the Great Plains and in the Rocky Mountains of N. America. *A. tridentata* is from 3 to 6 or even 10 to 12 ft. in height, and is the common large sage brush of Idaho, Montana, Wyoming, and Colorado, extending also E. to the plains. Among other common species are *A. cana* and *A. filifolia*.

Sage Cock, or Cock of the Plains, kind of grouse, the *Centrocercus urophasianus*. The species is the largest American representative of the family, the male having an average length of over 30 in. and the female about 21 or 22; but these dimensions are frequently much exceeded. It is confined to the arid plains of the W. parts of the U. S., ranging from the Black Hills in the E. to California and Oregon in the W., and from British America in the N. to Arizona in the S. In those plains the sage brush grows in abundance, and the sage cock feeds on that plant, whereby a bitter flavor is imparted to the flesh.

Saghalien (sä-gä-lēn'). See SAKHALIN.

Sag'inaw, capital of Saginaw Co., Mich.; on Saginaw River; 64 m. NE. of Lansing, the state capital; 30 ft. above the river; navigable from Saginaw Bay on Lake Huron to this point, and here crossed by several bridges. Lumber, salt, and coal are the principal industries; plate glass, beet sugar, iron and steel, malt liquors, and articles of wood are manufactured. The present city was created 1890, the former cities of Saginaw City and E. Saginaw, on opposite sides of the river, being consolidated; contains German Lutheran Seminary, St. Andrew's Academy (Roman Catholic), Medical College, Women's, St. Mary's, and Saginaw hospitals, and East Side and West Side high schools Pop. (1910) 50,510.

Sagitta'rius, sign of the zodiac into which the sun enters about November 22d. There is also a constellation Sagittarius, corresponding to the sign Capricornus. See ZODIAC.

SAGITTARIUS.

Sa'go, variety of starch obtained from the pith of the stem of *Metroxylon rumphii*, *M. lævе*, and other palms. *M. rumphii* grows in low lands in the E. Indies. There are several varieties: common sago, which is insoluble in cold water, but swells to a transparent jelly on boiling; and pearl sago, which has been granulated and subjected to some process, probably involving heat, which causes it to be somewhat soluble, even in cold water.

Sago Cheese, corrupt name given in the U. S. to Schabzieger cheese.

Sago Palm, palm that yields sago; also a cycad that yields a kind of sago.

Sagoyewath'a. See RED JACKET.

Saguenay (săg-ĕ-nā') **Riv'er,** one of the six great tributaries of the St. Lawrence, carrying the surplus waters of Lake St. John a distance

of over 130 m. to the parent stream at Tadousac. For 50 m. the river passes within the rugged highlands of the Laurentides, between banks that descend precipitously for 1,500 ft. to the surface of the water, with here and there a more striking promontory rising even higher. Here the depth in some places is over 2,000 ft., the river being navigable for the largest vessels as far as Ha Ha Bay.

Sagun'tum, ancient town of Spain; in Hispania Tarraconensis; founded by Greek colonists from Zacynthus (modern Zante). In 219 B.C. it was besieged by Hannibal. After a year of energetic resistance the Saguntines, pressed by famine, set fire to their city, and the men issued forth to battle and were killed. This conquest by Hannibal occasioned the second Punic War. The Romans rebuilt the city and called it *Muri veteres* (the old walls), whence the name of Murviedro, which occupies the site.

Sahara (sȧ-hȧ'rȧ), desert of Africa; largest in the world; occupying an area estimated at 4,000,000 sq. m., and extending 3,000 m. from the Atlantic to the Nile, with a width of 1,000 m. between the Sudan and the countries of the Mediterranean. If the grassy S. versant of the N. mountains, the comparatively fertile oases, and the extensive pastoral steppes on the S. border are excluded, the area is reduced to 2,400,000 sq. m. Of this the area covered by dunes or moving sands is only 500,000 sq. m. The surface is much diversified; average elevation above the sea about 1,300 ft.; only two small areas known to be below sea level. A mountainous region stretches through the desert SE. and NW., extending from S. of Algeria to Darfur, dividing the E. or Libyan desert from the central and W. Sahara, and having its backbone in the Tassili and Tibesti mountains. They make a nearly unbroken range 1,100 m. long, culminating in Mount Tarso of Tibesti, about 8,000 ft. high. To the W. of this range and connected with it are the mountain complexes of Ahaggar and Azjer, with elevations of 4,000 to 5,000 ft.

A few of the rivers debouch into the Atlantic, the principal being the Draa and the Sakiet-el-Hamra, near the NW. angle of the Sahara, the former with water, the latter without. Many smaller valleys debouch into the Syrtes of the Mediterranean. The richest part of these stream beds is the central elevated region of Ahaggar, Azjer, and Tassili. From this region radiate innumerable stream beds, some of which are lost in the sand at lower levels, while others can be traced to the Mediterranean or to the basin of the Niger.

The mean annual temperatures are about those of N. Mexico, passing from 68° F. at the N. to 86° at the S. In the N. and central parts winter temperatures below freezing are common. In summer, temperatures of about 120° are not rare. Dew and hoar frost are almost unknown. Yet there is probably no part of the desert where rain does not fall occasionally, but sometimes years intervene between showers. N. of the parallel 20° N., mid and late summer rains occur in the mountainous regions, but elsewhere the rainfall becomes irregular and occasional only. This condition continues to the Atlas Mountains on the W. and to the Mediterranean on the E.

The winds that come from the Sahara and blow out over the neighboring regions are of a peculiar and sometimes destructive character. They have received many names—harmattan, leste, sirocco, chamsin, simoom. They are characterized by heat, dryness, and dust. This desert has continued from the earliest known times without material change, except a possible progressive (but slight) increase in aridity, a purely atmospheric phenomenon, due to the outflow of wind in winter, and to the great heat when the inflow takes place in summer. The central part of Sahara, from Tunis and Tripoli to the central Sudan, is occupied by the Tuaregs, numbering about 75,000. The Tibbus occupy the E. part. They are probably of Negro affinities, and are estimated at 28,000. The W. Sahara is occupied by Moors—people of mixed race—Arab, Berber, and Negro in varying proportions. The Sahara is crossed in all directions by trade routes, properly trails, along which a considerable commerce has been conducted from the earliest times. The trade is one of transportation, except for salt, which is collected in the desert in large quantities. About two thirds of the Sahara is now in the French sphere of influence, and about half of the remainder under Turkish authority.

Sahâranpur (sȧ-hȧ'rȧn-pōr), city in district of same name, united provinces of Agra and Oudh, India; 88 m. N. by E. of Delhi; administrative headquarters of district; principal trade is in grain, sugar, molasses, and native cloth. Pop. (1901) 66,254.

Sa'hib, Tippoo. See TIPPOO SAHIB.

Saida (sī'dȧ), town in Syria, on the Mediterranean; 20 m. S. of Beyrout; carries on an active trade in goatskins, oil, rags, silk, tobacco, and especially fruit; occupies part of the site of ancient Sidon. Pop. abt. 11,000.

Saig'idæ, or **Saigi'næ,** peculiar family of antelopelike ruminants, or perhaps a subfamily of the *Bovidæ*, distinguished by the peculiarly enlarged muzzle and the coördinated modifications of the nasal region of the skull. The form is that of the antelopes or sheep, and the horns are persistent, ringed, and somewhat lyriform. A single species exists, the saiga (*Saiga tartarica*), described by Pallas, 1777, under the name *Antilope saiga*. The saiga is an inhabitant of the plains of N. Asia, especially in the region of Mt. Altai, but extends also in E. Europe as far as the Crimea. It is about the size of a small deer.

Sai'go, Takamori, or Kichinosuke, 1825–77; Japanese military officer and statesman; b. Satsuma; developed imperialist notions and hatred of the Yedo shogunate, then in power, and spent several years in exile. In 1868, when the court declared against the shogunate, he became lieutenant general in the imperial army, and later as its commander in chief, was associated with the complete triumph of his party. He occupied office, 1870, as councilor of state, but growing dissatisfaction with the Europeanization of everything

Japanese, and the desire for a more warlike policy in Korea, sent him into retirement, and the final result was the Satsuma Rebellion. In 1890 the ban of degradation was removed from his name.

Saigon (sä'ē-gŏn), capital of French Indo-China; on the Saigon, a branch of the Donnai, 35 m. from its mouth in the China Sea. The Donnai forms at Saigon one of the finest harbors of the E. coast of Asia, lined with stone quays and surrounded with dockyards, arsenals, and magazines, and naval establishments. The town carries on an active trade, exporting cotton, rice, sugar, indigo, and dyewoods. Pop. (1901) 50,870.

Saikio (sī-kē'ō). See KYOTO.

Sail, sheet of canvas or other material used to propel a vessel through the water. Sails are made by sewing cloths of canvas together with twine in a double seam, and binding the edges around with a *bolt rope* to relieve the strain on the canvas, the whole being so fitted as to present a flat surface to the wind. Bands of canvas are placed wherever additional strength is required or the sail is exposed to chafing, as the *reef-bands*, *buntline cloths*, etc. Sails are in shape either quadrilateral or triangular. In all quadrilateral sails the upper edge is called the *head*, the lower edge the foot, and the sides the *leeches*. When the head and foot are parallel, the upper corners are called the *head-earrings*, and the lower ones *clews*. When the head and foot are not parallel, the foremost corner at the head is called the *throat* or *neck*, the after upper corner the *peak*, the forward lower corner the *tack*, and the after lower corner the *clew*. In triangular sails there are the head, tack, and clew. In all sails the foremost edge is called the *luff* or *fore leech*, and the aftermost the *after leech*. Sails are classed as *square sails* and *fore-and-aft sails*. The former, all quadrilateral, are those which make a large angle with the direction of the keel, and are spread by yards, as the principal sails of a ship, or by yards and booms, as the *studding sails*. The latter, either quadrilateral or triangular, are those which make but a small angle with the line of the keel. The triangular are spread by a yard, as *lateen sails*; by a stay, as *staysails*; or by a mast, as *shoulder-of-mutton sails*. The quadrilateral are extended by means of gaffs and booms, the head of the sail being attached to the gaff. In all fore-and-aft sails the luff is attached throughout its length to the yard, stay, or mast. The principal sails of a ship are *courses*, the lowest ones; *topsails*, next above the courses; *topgallant sails*; *royals*; and, sometimes, *skysails*. These sails are attached by the head to their proper yards, and, excepting the courses, are spread by having their clews drawn out by ropes called *sheets* to sheaves in the ends of the yards below them. The clews of the courses are in like manner drawn to the *chesstrees* and *bumpkins* on deck. Studding sails are set beyond the leeches of the foresail, fore topsails and main topsails, and fore topgallant sails and main topgallant sails, the head being extended by a studding-sail yard, and the foot by a boom run out beyond the end of the yard next below. Staysails are hoisted upon the stays between the masts, the foot being stretched out by a rope or whip called the *sheet*. All sails take their names from the mast, yard, or stay to which they are attached. Thus that on the main yard is called the mainsail, above which are the main topsail, main topgallant sail, and main royal. Boats' sails follow the rules given as to form and class, but have peculiar names. The most common are spritsails, standing lugs, dipping lugs, and sliding gunters.

Sain'foin, perennial leguminous forage plant, *Onobrychis sativa*, valuable on dry, chalky lands; prized as green forage, as hay, and as a crop to be plowed under.

Saint (sānt), in the New Testament, a title of all Christians (Rom. i, 7; 1 Cor. i, 2; Eph. i, 1; Phil. i, 1, etc.), in the sense that they are called out of the world, regenerated by the Holy Spirit, and consecrated to God. The oldest MSS. of the Gospels bear simply the names of Matthew, Mark, Luke, and John, without "S." attached to them. After the fourth century the term began to be applied to particular persons of eminence in piety and services to the Church, as the apostles, evangelists, and martyrs. Special honor was paid to their memory, which gradually assumed the character of a limited Christian hero worship, called by the scholastic divines *doulia* or *veneratio* (as distinct from *latria* or *adoratio*, which is due to God alone, and *hyperdulia*, or a peculiar degree of veneration which is claimed for the Virgin Mary). The Greek and Roman churches consider it proper and useful to pray to them, as the friends of God, that through their advocacy may be obtained from Him all necessaries of life (hence the form *Ora pro nobis*, Pray for us).

To prevent the immoderate increase of the number of saints, the popes since Alexander III (1170 A.D.) have monopolized the rights of canonization. The act of canonization is preceded by a regular process of law, in which one acts as the accuser of the candidate, another as his advocate. The necessary qualifications for the honor are, besides the highest sanctity, the power of working miracles, either during their lifetimes, or after their death through their pictures or relics or the invocation of their aid. Several centuries usually intervene between the death of a saint and his canonization. The Roman Catholic Church celebrates the memory of each canonized saint on the day of his death (which is regarded as his birthday in heaven). Its calendar of saints includes (1) the apostles, evangelists, and most eminent martyrs, fathers, schoolmen, and missionaries down to the Reformation, who are the general property of Christendom; (2) the specifically Roman saints who lived after the Reformation and zealously opposed Protestant doctrines (as Ignatius Loyola, Charles Borromeo); (3) a few popes.

St. Al'bans (ancient, *Verulamium*), city in Hertfordshire, England; on the Ver; 20 m. NNW. of London. In commemoration of the

martyrdom of St. Alban (303) Offa, King of Mercia, founded a Benedictine abbey here, 793, which obtained precedence over all other abbeys in England. The abbey church, consecrated 1115, still remains the most important example of Norman architecture in England. St. Albans is historically interesting from the two battles fought here during the wars of the Roses, 1455 and 1461. Pop. (1901) 16,019.

St. Ald'wyn, Sir Michael Edward Hicks-Beach (first Viscount of, created 1906), 1837–1916; English statesman; b. London; elected to Parliament for E. Gloucestershire, 1864, and served the Conservative interest; was parliamentary secretary to the Poor Law Board, 1868, and later a member of the Royal Commission on Friendly Societies. When the Conservatives returned to power, 1874, he was appointed Chief Secretary for Ireland, and had a seat in the cabinet, 1877; was Secretary of State for the Colonies, 1878–80; Chancellor of the Exchequer, 1885–86; again Chief Secretary for Ireland, 1886–87; president of the Board of Trade, 1888–92; again Chancellor of the Exchequer, 1895–1902.

St. Aloys'ius. See GONZAGA, LUIGI.

St. An'drews, town of Fife, Scotland; on a rocky plateau adjoining St. Andrews Bay; 42 m. NNE. of Edinburgh. The schools of St. Andrews were noted as early as 1120, and, 1411, the university, the first in Scotland, was founded. St. Andrews is a popular watering place, and widely known as the headquarters of golf. Pop. (1901) 7,621.

St. An'gelo, Cas'tle of. See HADRIAN'S TOMB.

St. An'thony's Fire. See ERYSIPELAS.

St. Au'gustine, capital of St. John's Co., Fla.; on peninsula formed by the Matanzas and San Sebastian rivers, W. of the N. end of Anastasia Island; 38 m. SE. of Jacksonville. The ancient city extended from the Franciscan convent (now St. Francis barracks) N. to the castle of San Marco (now Fort Marion), a distance of nearly 1 m. The only remaining evidence of its ancient wall is the city gateway—a picturesque ruin—with 30 ft. of the original wall on each side. As late as 1817 entrance to the city from the mainland was effected by a drawbridge. The hotels of St. Augustine, notably the Ponce de Leon, Alcazar, and Cordova, are among the finest in the world. St. Augustine is the seat of St. Joseph's Academy (Roman Catholic) and the State Institute for the Education of the Deaf and the Blind. The manufacturing interest is confined to cigars, but this is considerable. St. Augustine is the oldest city in the U. S., having been founded 1565, when Don Pedro Menendez de Aviles, with 1,500 followers, disembarked here and took possession in the name of Philip II of Spain. The present Fort Marion is the most notable and best preserved of the works of the Spanish reign, and is a fine specimen of the military engineering of that age. With the exception of a water battery, which the U. S. Govt. added 1842–43, and some few repairs, the fort is as completed 1756. It was in course of construction over one hundred years. Pop. (1910) 5,494.

St. Barthol'omew, Mas'sacre of. See BARTHOLOMEW, ST., MASSACRE OF.

St. Bernard, Lit'tle, celebrated pass across the Graian Alps, on the frontier of Savoy and Piedmont, Italy, S. of Mont Blanc; is 7,200 ft. high, leads from the valley of the Isère into that of Dora Baltea, and has near the summit a convent for the relief of travelers, believed to have been founded by St. Bernard of Menthon.

St. Bernard' Pass. See BERNARD, GREAT ST.

St. Bren'dan, Brandan, or **Branda'nus,** Irish monk famous for his sea voyages, about which many legends have been handed down from the Middle Ages; flourished probably in the sixth century A.D. He was said to have gone on a nine years' voyage and visited unknown lands, which are described in the work "The Fortunate Islands," published in the eleventh century. A popular tradition has identified the Fortunate Islands of St. Brendan with America, and given to the Irish saint the credit that belongs to Columbus, but his claims have no historical foundation.

St. Bride, or **St. Brid'get.** See BRIDGET, ST.

St. Cath'erine's, a city on the Welland Canal, in Lincoln Co., Ontario, Canada. The city has a large trade in fruit, and has canning factories, flour mills, and manufactures of saws, machinery, baskets, leather, electric cars, and beer. Pop. (1911) 12,484.

St. Chris'topher. See ST. KITTS.

St. Clair', Arthur, 1734–1818; American general; b. Thurso, Scotland; entered the British army as an ensign; came to America with Admiral Boscawen, and settled in Pennsylvania. In January, 1776, he was commissioned colonel in the Continental army, and, August, brigadier general; was in the battles of Trenton and Princeton. In 1777 he was made a major general, and commanded Ticonderoga, but was compelled to evacuate it before Burgoyne. He was president of Congress, 1787; Governor of the Northwest Territory, 1789–1802; commanded the army operating against the Miami Indians, 1791; was surprised, November 4th, near the Miami villages, and his force was cut to pieces. A congressional committee of investigation exonerated him.

St. Clair, Lake, smallest of the Laurentian chain of lakes; receives the overflow of Lake Huron through St. Clair River, and discharges through Detroit River into Lake Erie; 30 m. long from N. to S., 24 m. in maximum and 12 in mean breadth; area, 396 sq. m.; mean elevation above the sea level, 576 ft.

St. Clair Riv'er (originally named SINCLAIR, from Patrick Sinclair, a British officer, who purchased land along the river from the Indians, 1765), outlet of Lake Huron; 41 m. long, with fall of 5.4 ft. The river has built a low-grade delta at its mouth, known as the St. Clair Flats, and divides into seven principal channels before reaching Lake St. Clair.

One of the branches into which the stream divides has been improved for navigation, and its course shortened by the dredging of a canal.

St. Cloud (sāṅ klō'), town of Seine-et-Oise, France; on the Seine; 6 m. SW. of Paris; derives its name from St. Clodoald, grandson of Clovis, who founded a monastery here, 551. In the palace of St. Cloud, built 1572, Henry III was assassinated, 1589; and here the *coup d'état* of November 10, 1799, which placed Napoleon Bonaparte at the head of the French Govt., was effected. The capitulation of Paris, 1815, was signed here, and also the decrees of Charles X, 1830, which caused the second revolution. Pop. (1901) 7,195.

St. Croix (sānt kroi'), formerly SANTA CRUZ, island of the Danish W. Indies; 37 m. S. of St. Thomas; area, 83 sq. m.; sugar and rum (known as Santa Cruz rum) are the principal products and exports. Santa Cruz was discovered by Columbus, 1493; occupied in turn by Spanish, English, and French adventurers, and sold by the French to a Danish company, 1733; chief town, Christiansted.

St. Croix, or Schoo'dic, Riv'er, part of the boundary between Maine and New Brunswick; flows from Grand Lake in a general ESE. course, and falls into Passamaquoddy Bay; navigable to Calais, Me., above which it affords fine water power; is 75 m. in length.

Also the name of a stream which rises in Douglas Co., Wis.; flows SW. to the Minnesota line; from this point S, for more than 100 m., it is the boundary between Wisconsin and Minnesota; 150 m. long; navigable 54 m. to the Dalles or Falls of the St. Croix. After passing through Lake St. Croix it flows into the Mississippi at Prescott, Wis. At its falls it descends 50 ft. in 300 yds.

St. Cyr (sāṅ sēr'), village of France; in park of Versailles; noted for the celebrated establishment which Madame de Maintenon founded here 1686 for the education of daughters of the French nobility. In 1793 the building was transformed into a military hospital, and, 1806, Napoleon removed the military academy from Fontainebleau to this place. Pop. (1901) 2,649.

St. Denis (dnē'), town of Seine, France; 4 m. N. of Paris. The abbey of St. Denis was founded by Dagobert I, 613; a church begun by Pepin, the father of Charlemagne, was completed 775. This edifice was demolished during the reign of Louis VII, and a more imposing one erected 1144, the porch and two towers of which yet remain; the rest of the present building was reconstructed by Louis VIII. Up to the time of the revolution the remains of the kings and princes of France were deposited here. Pop. (1906) 64,790.

St. Domin'go. See SANTO DOMINGO.

Sainte-Beuve (sāṅt-bēv'), **Charles Augustin,** 1804–69; French poet and critic; b. Boulogne; settled in Paris and contributed to newspapers and reviews; received employment at the Mazarin Library, 1840; elected to the Academy, 1845; Prof. of French Literature at Liège, 1848–49; returned to Paris and held various positions under Napoleon III; senator after 1865; works include "French Poetry in the XVIth Century," "Port Royal," a novel, "Volupté," "Consolations," and other volumes of verse, and a series of over thirty volumes of "Critiques," "Portraits," "Galleries," and "Causeries," selections from which have been translated into English; "Portraits of Celebrated Women," "English Portraits."

Sainte-Claire' Deville', Henri Étienne, 1818–81; French chemist; b. St. Thomas, W. Indies; appointed dean of the faculty of science in Besançon, 1844; obtained chair of chemistry in the Normal School, Paris, 1851; shortly afterwards the similar post in the Sorbonne. In 1850 he discovered anhydrous nitric acid; 1855, succeeded in making in mass aluminum, which before had been obtained only in globules. With Troost he experimented on the artificial production of minerals, and produced in this way the sapphire, ruby, and emerald. His principal contribution to theoretical chemistry was his explanation of the phenomena of dissociation; published "Aluminium" and "Metallurgy of Platinum."

St. (sānt) Ed'mundsbury. See BURY ST. EDMUNDS.

St. Eli'as, Mount, in Alaska; in lat. 60° 17′ 35.1″ and lon. 140° 55′ 47.3″; elevation of 10,024 ft.; is not a volcanic mountain, but the upturned border of a block of the earth's crust bounded by faults; covered with ice and snow from base to summit, and surrounded on all sides by glaciers; first ascended by the party of the Duke of the Abruzzi, 1897.

St. Étienne (sāṅ ā-tē-ēnn'), town of Loire, France; on the Furens; 32 m. SW. of Lyons; in center of rich coal fields; manufactures ribbons and firearms, besides large quantities of cutlery, files, nails, etc. Pop. (1906) 146,788.

St. (sānt) Fran'cis Riv'er, one of the six great tributaries of the St. Lawrence; rises in Lake St. Francis, Beauce and Wolfe cos., province of Quebec, and falls into the St. Lawrence at Lake St. Peter after a course of 120 m.; tributaries: the Salmon, Coaticook, Massawippi, and Magog, which drains Lake Memphremagog. Its course is frequently interrupted by shallows and rapids.

St. Francis River, tributary of the Mississippi, forming part of the boundary between Missouri and Arkansas; rises in the Iron Mountain district of SW. Missouri, and flows SW. 450 m., entering the Mississippi near Helena, Ark.; navigable 150 m.; passes through a continuous swamp after entering Arkansas, and spreads into numerous lakes; serves as an important backwater in overflows of the Mississippi River.

St. Gall, 554–627; saint of the Roman Catholic Church; native of Ireland, and pupil of St. Columban; originally named Cellach, or Caillech; followed St. Columban to Switzerland, 590, and became the apostle of the Suevi and the Alemanni. In 614 he built his cell in a dense forest on the Steinach, in Switzerland,

where now stands the city of St. Gall, and gathered around him a number of hermits, who lived together according to the rule of St. Columban. From this beginning gradually developed the famous monastery of St. Gall, one of the principal centers of learning during the Middle Ages. After the Reformation the institution gradually fell into decay, but it retained its enormous revenues until the revolution. It was secularized, 1798; its estates were confiscated, and its territory was formed into a bishopric.

St. Gall, capital of canton of same name, Switzerland; on the Steinach, in a valley 2,251 ft. above sea; has a fine cathedral, good educational institutions, large public libraries, and extensive manufactures of woolen, linen, and cotton fabrics, especially fine muslins and printed calicoes. Pop. (1908) 54,127.

Saint-Gau'dens, Augustus, 1848–1907; American sculptor; b. Dublin, Ireland; son of Bernard Paul Saint-Gaudens, a native of Saint-Gaudens, France; was brought to the U. S. in infancy; apprenticed to a cameo cutter in New York City; studied at the Cooper Union and Academy of Design; 1867, went to Paris for further study, and there made some medallions in low relief of Bastien-Lepage and other friends; also a figure of St. Tammany for the façade of Tammany Hall, New York City; studied, 1870–72, in Rome, where he executed a "Hiawatha"; settled in New York City, 1872. His works include the statues of "Admiral Farragut," "Peter Cooper," and "Gen. Sherman," New York City; "Adoration of the Cross," St. Thomas's Church, same city; "Gov. Randall," Sailors' Snug Harbor, Staten Island; "Shaw Memorial," Boston, Mass.; "Samuel Chapin, Puritan," Springfield, Mass.; "Abraham Lincoln" and "Gen. John A. Logan," Chicago, Ill.; "Bishop Phillips Brooks," Trinity Church, Boston, Mass.; "Marcus A. Hanna," Cleveland, Ohio; caryatides, Allbright Gallery, Buffalo, N. Y.; "Charles Stewart Parnell," Dublin, Ireland; memorial to Robert Louis Stevenson, St. Giles Church, Edinburgh, Scotland; "Nirvana," or "Grief," Rock Creek Cemetery, Washington, D. C.; designs for new U. S. gold coins and one-cent piece. He was the first president of the Society of American Artists and of the Sculpture Society.

St. George's. See BERMUDA ISLANDS.

St. George's, capital of Grenada Island and of the British colony of the Windward Islands, W. Indies; on a bay near the S. end of the island. The harbor is one of the best in the W. Indies; the town has a considerable trade with the other islands and with Europe and the U. S. Pop. (1907) estimated at 71,504.

St. George's Chan'nel, body of water connecting the Irish Sea with the Atlantic and separating Ireland from Wales; 100 m. long, 65 m. broad.

St. Gotthard (sănt-gŏ'tär), central mountain mass of the Alps between the Swiss cantons of Uri and Ticino; watershed of the Rhine, Rhone, and Ticino; is a ridge about 20 m. long, with a dozen peaks more than 8,750 ft. high and culminating in Pizzo Rotondo, 10,490 ft.; best known from the St. Gotthard Pass, elevation 6,936 ft., which has been traversed for many centuries, and, until the St. Bernard, Simplon, and Splügen were made passable for vehicles, was the chief route between the N. and S. slopes of the Alps. In 1881 a railway tuhnel under the pass was completed. It is a little more than 9 m. long, reaches an elevation of 3,786 ft. at its culminating point, and permits of a ready and direct passage from Bavaria to Lombardy. The pass is of strategic importance and fortified.

St. (sĕnt) **Hele'na,** British island in the S. Atlantic, 700 m. from the nearest land (Isle of Ascension), 10½ m. long and 6½ broad; discovered by Juan de Nova Castella, the Portuguese navigator, May 21, 1501 (St. Helena's Day); remained uninhabited until the Dutch took possession of it; taken from the Dutch by England, 1673; chief town, Jamestown. St. Helena is best known as the place of exile and death of Napoleon Bonaparte.

St. Hel'ens, town of Lancashire, England; 12 m. ENE. of Liverpool; principal seat in England of the manufacture of different kinds of glass; has extensive alkali, copper smelting, and iron works. Pop. (1905) 91,153.

Saint-Hilaire (săn-tē-lār'), **Geoffrey.** See GEOFFREY SAINT-HILAIRE.

Saint-Hilaire, Jules. See BARTHÉLEMY SAINT-HILAIRE.

Saintine (săn-tēn'), pen name of JOSEPH XAVIER BONIFACE, 1798–1865; French author; b. Paris; published a volume of poems, several novels, and (alone or in connection with Scribe, Duvert, Masson, and others), about 200 plays; best known for the sketch, "Picciola," which ran through forty editions, was translated into all European languages, and received the Montyon prize from the Academy.

St. Jean d'A'cre. See ACRE.

St. John (sānt' jŏn), **Henry.** See BOLINGBROKE.

St. John (W. Indies). See ST. THOMAS.

St. John, capital of St. John Co., New Brunswick, Canada; on St. John River at its entrance into Bay of Fundy; 277 m. NW. of Halifax; has one of the finest harbors on the Atlantic, protected by a breakwater 2,250 ft. long, and always free from ice. Partridge Island, at its entrance, contains a fine lighthouse and a quarantine hospital. Among notable buildings are the customhouse, post office, city building, General Public Hospital, Provincial Lunatic Asylum, Protestant and Roman Catholic orphan asylums, Home for Aged Females, Sailors' Home, Wiggin's Orphan Asylum for sons of seamen, reformatory for boys, free public library, Mechanics' Institute, Masonic and Odd-Fellows' halls, Dominion Savings Bank, and the railway station. The finest church buildings are the Roman Catholic Cathedral and the Centenary (Methodist), Trinity (Episcopal), St. Andrew's (Presbyterian), and Germain Street (Baptist) churches; the Victoria, Cen-

tennial, and Albert schools. Mount Pleasant Convent School (Roman Catholic), Davenport School for Boys (Episcopal), and the Madras School are of high grade. The St. John is spanned by a suspension bridge for vehicles, and by a steel cantilever bridge for railways. There is regular steamship connection with Prince Edward Island, Nova Scotia, Boston, the W. Indies, and European ports. The city disputes with Halifax the claim to be called the winter port of the Dominion. Chief industries: the manufacture of lumber, cotton goods, rolled iron, nails, nuts and bolts, engines and boilers, furniture, lead pipe, paint, carriages, and sashes and doors. The site was visited by de Monts, 1604; occupied by the French as a fort under Charles de le Tour, 1635; passed under British rule, 1713, by Treaty of Utrecht; settled by American loyalists, principally from New England, 1783; incorporated by royal charter as a city, 1785. Pop. (1911) 42,511.

St. John Lake, large circular body of water about 200 m. N. of Quebec city, and forming the source of the Saguenay River; 28 m. long and 25 broad; receives the water of several large and navigable streams, as the Peribonca, Mistassini, and Ashuapmouchouan; also the Metabetchouan, with falls of 236 ft. in height at its mouth, and the Ouiatchouan, having its source near the head waters of the St. Maurice.

St. John of Jeru'salem, Knights of the Or'der of (also known as KNIGHTS HOSPITALLERS), military and religious order that originated at the close of the eleventh century at Jerusalem, where a hospital and hostelry for pilgrims had been established. The confraternity of pilgrims that had charge of the establishment was organized as a monastic order with philanthropic principles, and was formally sanctioned, 1113, when the members assumed the black Augustinian garment with a white cross. A few years later it was reorganized on a military basis. Many celebrated knights joined it; its defenses of Christianity in the field gave it celebrity, and by endowments it became one of the richest and most famous of the Christian orders, but its quarrels with the Templars caused much scandal. After the conquest of the Holy Land by the Saracens, the knights removed, 1291, to Limasol, Cyprus, and thence, 1309, to Rhodes.

In the meantime their revenues were increased from the confiscated estates of the Templars. In 1479 they repelled Mohammed II, who besieged them in the city of Rhodes, but, 1522, were compelled to surrender Rhodes to Suleiman II, and at the same time they lost large possessions in Europe. In 1530 Charles V gave them the island of Malta, and they were subsequently called Knights of Malta, as well as Knights of Rhodes. Their heroic and successful defense of Malta against an immense force under Suleiman II, 1565, constitutes one of the most brilliant pages in history. Soon after, however, the order began to decline; during the revolution the knights lost their large possessions in France; Napoleon drove them from Malta, 1798, and the English on conquering that island, 1800, refused to reinstate them. The last grand master, Hompesch, transformed his dignity to Paul, Emperor of Russia, but the pope gave it to an obscure Italian. Since 1798 the order has existed only nominally.

St. John Riv'er, river which rises on the boundary of Maine and Quebec, near the head of the Penobscot; is the boundary between the U. S. and Canada for nearly 40 m.; then traverses the wilds of N. Maine, and is known as the Walloostook, or Main St. John; joins the St. Francis some 150 m. below its origin; below this is the N. boundary of Maine for about 75 m.; below this part of its course it is wholly in Canadian territory; empties into the Bay of Fundy at St. John, New Brunswick; total length, 550 m. At Grand Falls, 225 m. above its mouth, the river falls 75 ft. perpendicularly. It is navigable by large steamers to Fredericton, 80 m. from its mouth, and by small ones to Woodstock, 145 m. Its navigation was made free to U. S. citizens by the Ashburton Treaty.

St. John's, capital of Newfoundland; port of America nearest to Europe; on the Avalon Peninsula and the Atlantic; 540 m. NE. of Halifax; 1,640 m. W. by S. of Valentia, Ireland; has a spacious and secure harbor, accessible for large vessels at all tides, and provided with a dry dock 600 ft. long. The entrance is through an opening in the rock-bound coast called the "Narrows," though 600 ft. wide at its narrowest part. Principal buildings include the Roman Catholic cathedral, Government House, House of Parliament, customhouse, market house, and courthouse. Besides the colonial schools, there are St. Bonaventura College (Roman Catholic), and Anglican, Methodist, and Presbyterian colleges. The Allan steamships call at St. John's on their outward and inward passages. The city has also steamboat connections with the principal ports N. and S. Steamers of two lines plying between Liverpool and Halifax, and between New York City, Halifax, and St. John's respectively, call at intervals of about ten days. The people are engaged principally in business connected with the fisheries. Seal oil and seal skins and codfish are exported. There are several sawmills, machine shops, iron foundries, furniture factories, tobacco factories, breweries, tanneries, and boot and shoe, and rope, twine, and net factories. The city has twice been visited by destructive fires (1846, 1892). Pop. (1907) estimated at 31,501.

St. Johns'bury, capital of Caledonia Co., Vt.; on the Passumpsic River; 34 m. ENE. of Montpelier; noted for having the largest manufactory of scales and balances in the world; contains also foundries and machine shops and agricultural-implement works. Among notable institutions are the St. Johnsbury Academy, built and endowed by Thaddeus Fairbanks; St. Johnsbury Athenæum, built and provided with library and art gallery by Horace Fairbanks, and museum of natural science. Pop. (1910) 6,693.

St. John's Dance. See DANCING MANIA.

St. John's Riv'er, stream which rises in the swamps of Brevard Co., Fla., and after a course

of nearly 400 m. reaches the Atlantic; navigated by steamboats to Enterprise, 230 m. from its mouth, and small steamers have ascended 60 m. above that point; for nearly two thirds of its course it is nowhere less than a mile in breadth, and often expands into spacious lakes; lower course nearly parallel with the coast and about 20 m. from it. After passing the bar at its mouth there is a depth of 14 or 15 ft. to Jacksonville, 10 ft. to Palatka, and 8 ft. to Lake George.

St. John's-wort Fam'ily, the *Hypericaceæ*, a small group of 240 species of choripetalous, dicotyledonous herbs, shrubs, and trees. The forty species of N. America, some of which are showy, belong mainly to the genus *Hypericum*. The common St. John's-wort (*H. perforatum*) is a yellow-flowered perennial weed, naturalized in the U. S. from Europe.

St. Jo'seph, capital of Buchanan Co., Mo.; on the Missouri River, opposite Elwood, Kan., with which it is connected by a steel bridge; 60 m. NW. of Kansas City; center of a fertile agricultural region; on hilly ground, beautified by public parks. Public buildings include city hall and market house, stock exchange, county buildings, U. S. Govt. building, Union depot, free public library. Here are two medical colleges. Important manufactures are shirts and overalls, boots and shoes, harness, tinware, woolen goods, plows, pumps, stoves, furniture, flour, cereal foods, leather ware, malted liquors. At the S. limits of the city are extensive stockyards; slaughtering and meat packing are extensively carried on; shipments of corn, wheat, and oats are very large. City founded by Joseph Robidoux, at one time connected with the American Fur Company, who established a trading post here, 1826. In 1827 several white families settled at the Blacksnake Hills, as the site of St. Joseph was called; town of St. Joseph laid out, 1843; became the county seat, 1846; made a city, 1851; city of second class, 1885. Pop. (1910) 77,403.

Saint Just (săn zhŭst'), **Antoine Louis Leon de,** 1767-94; French revolutionist; b. Decize, Nièvre; member of the Convention, 1792, where he advocated most extreme measures; of the Committee of Public Safety, and one of the most conspicuous leaders during the Reign of Terror; became president of the Convention, February, 1794; brought Danton to the guillotine; attempted on the 9th Thermidor to defend Robespierre, but was arrested, and executed the next day.

St. (sănt) Kitts, or St. Chris'topher, island of the British E. Indies (Leeward Islands colony); area, 65 sq. m.; pop. (1901) 29,782; capital, Basseterre; is mountainous, well watered, and has a salubrious climate. Nearly all available land is planted with sugar cane, and sugar and rum are the principal products. Dependencies of St. Kitts are the islands of Nevis, immediately SE. of it (area, 50 sq. m.), and Anguilla, a little farther S. (area, 35 sq. m.).

St. Law'rence, river and gulf of N. America. The river is the outlet of the Great Lakes and drains an area of approximately 530,000 sq. m., about two thirds of which is in Canada and the remainder in the U. S. From the extreme head waters of the St. Lawrence, W. of Lake Superior, to the mouth of its estuary, near Anticosti Island, is about 2,200 m. This vast drainage system is divided into three natural portions: (1) The lake region, embracing the Great Lakes and the lands draining to them, above the outlet of Lake Ontario; (2) the river tract, from Lake Ontario to Quebec; (3) the estuary and gulf tract, from Quebec to the sea. The river proper may be said to extend from the outlet of Lake Ontario to the island of Orleans below Quebec, 330 m., where it becomes an estuary. Ocean steamers ascend to Montreal, 180 m. above Quebec, and the lowest rapids occur above that port. The river is obstructed by numerous islands and rapids, and at times expands into lakes several miles broad. There are no vertical falls. Steamers drawing less than 9 ft. descend the rapids, but the return trip is made by a system of canals having a total length of 42 m. The volume of the river at its source is 300,000 cu. ft. per second. Near Montreal the river is joined by the Ottawa from the NW., which adds about 90,000 cu. ft. per second. Before widening into an estuary, the St. Lawrence receives many other tributaries, the most important being the Richelieu, which drains Lake Champlain.

Below Quebec the St. Lawrence loses its river-like character and becomes an estuary 250 m. long, which widens seaward until its shores are 35 m. apart; it then merges with a still greater estuary known as the Gulf of St. Lawrence. A submerged river channel has been traced for 800 m. on the bottom of the estuary and gulf, to the submerged border of the continental plateau which lies about 100 m. beyond the present coast line. The seaward position of the submerged river valley is 6,600 ft. below the present sea level. When the St. Lawrence occupied its channel throughout and discharged at the true continental border, the land was elevated at least 3,600 ft. higher than at present, and the rapid stream cut deeply into the rocks. Its tributaries were similarly affected, and were enabled to excavate deep cañons, as is shown by the Saguenay, which joins the St. Lawrence from the N. in the central part of its estuary tract. Observations show that after the Glacial period, but long before written history began, the valley of the St. Lawrence was more deeply submerged than at present, and that the head of the estuary was then above Montreal.

St. Lawrence Is'land, extreme N. great island of the U. S.; in Bering Sea, just S. of Bering Strait, and nearer the Siberian than the Alaskan coast; extending E. and W., about 90 m. long by 30 broad; coasts generally low; in the NW. the hills reach a height of about 500 ft.; in the E. part are somewhat higher; climate arctic in character. A few Eskimo live on the shores, following the chase of the seal, walrus, and whale. The island was discovered by Bering, 1728, and fifty years after was taken to be two islands by Cook, who named them St. Lawrence and Clark.

St. Lou'is, metropolis of Missouri; on the W. bank of the Mississippi; 20 m. below the

mouth of the Missouri; over 480 ft. above sea; built on rolling ground, rising at some points 200 ft. above river level; has a river frontage of about 19 m. Beyond the third terrace the surface spreads out in a picturesque plateau. St. Louis is noted for the number and beauty of its public parks. The most important are Forest (1,374 acres); Tower Grove (267), containing bronze statues of Columbus, Humboldt, and Shakespeare; Missouri Botanical Garden (50), containing an arboretum, fruticetum, herbaceous and floral gardens, labyrinth, museum, and botanical library; Carondelet (180), O'Fallon (160), Lafayette (30), containing a bronze replica of Houdon's Washington and a statue of Thomas H. Benton; and the Fair Grounds (83), with a race course and large amphitheater. Tower Grove Park and the Missouri Botanical Garden adjoining were laid out and presented to the city by Henry Shaw. Public buildings of note are the city hall, old courthouse, now used by civil courts; Four Courts Building, planned after the Louvre, and used for a prison, as police headquarters, and by the criminal courts; the Exposition Building, State Insane Asylum, U. S. Govt. building, Chamber of Commerce, Carnegie Library, Museum of Fine Arts, Mercantile Club, Public Education Building, and Union Railroad station, one of the largest in the U. S.

Among institutions for higher instruction are Washington Univ. (*q.v.*), St. Louis Univ. (Roman Catholic), College of the Christian Brothers (Roman Catholic), Concordia Theological Seminary (Lutheran), Theological Seminary of the German Evangelical Synod, St. Louis and Missouri College, medical department of Washington Univ., Marion Sims-Beaumont College of Medicine, St. Louis College of Physicians and Surgeons, Homeopathic Medical College of Missouri, Missouri Dental College, St. Louis College of Pharmacy, St. Louis Training School for Nurses, St. Louis Law School, and St. Louis School of Fine Arts. The School of the Good Shepherd (Protestant Episcopal), Walther College (Lutheran), Academy of the Sacred Heart (Roman Catholic), Mary Institute, Hosmer Hall, Smith Academy, and the Manual Training School are schools of high reputation. Among institutions for dependents are a state school for the blind, St. Louis Day School for Deaf-mutes, and a deaf-mute institute connected with convent of Maria Consilia. There are six large libraries. Principal manufacturing plants: breweries, tobacco factories, flour and grist mills, slaughtering and packing houses, foundries and machine shops, manufactures of men's clothing, publishing houses, shops for making and repairing steam cars and street-railway cars, and manufactures of boots and shoes, furniture, carriages and wagons, paints, saddlery and harness, iron and steel, brick and tile, and lumber. Factory-system plants (1909), 2,667; capital employed, $269,392,000; value of annual products, $328,495,000.

St. Louis has importance as a receiving depot for much of the grain of the NW. consigned to Europe. There are twenty-two lines of railway, some of which are parts of extensive systems, entering the city. The receipts and shipments by rail and river of cotton, meats, flour, bran, wool, lead, zinc and spelter, coal, lumber, tobacco, wheat, corn, oats, hay, and live stock are very great. The wholesale trade exceeds in value $600,000,000 per annum. The city also commands over 6,000 m. of direct navigation by river, accessible to steamers and barges during a large part of the year. St. Louis is an interior port to which foreign merchandise can be transported without appraisement at port of original reception, and the yearly imports exceed $5,000,000 in value. Transportation by rail is facilitated by five bridges across the Mississippi and Missouri rivers. The most noted bridge is the lofty steel viaduct across the Mississippi for railway and highway traffic, designed and built by James B. Eads. The Merchants' bridge, built of steel on the truss plan, crosses the same river 3 m. above the Eads bridge, and the Bellefontaine bridge crosses the Missouri just above its junction with the Mississippi and connects with the Alton bridge across the Mississippi, furnishing approach from the N. and the E.

St. Louis was founded February 15, 1764, by Pierre Ligueste Laclède as a trading post, and named in honor of the patron saint of Louis XV of France. In 1765 it was made the capital of upper Louisiana. Although subject to the authority of Spain by the treaty concluded at Paris, 1763, St. Louis was practically under French control till formal possession was taken by Don Pedro Pierras, November 29, 1770. The transfer by France to the U. S. of the Louisiana Territory took place in St. Louis, March 9, 1804. The town was incorporated, November 9, 1809; the first steamboat arrived August 2, 1817; John Jacob Astor located the W. department of his company here, 1819; the town received a city charter, 1822; suffered from cholera, 1848; city made independent of county, 1876. During the Civil War it was constantly occupied by troops, was a base of supplies for the army, and contained a large military hospital. The Western Sanitary Commission had its headquarters here. In 1903 an international exposition was held, to celebrate the Louisiana Purchase Centennial, and, 1906, the first Deep Waterways Convention. Pop. (1910) 687,029.

St. Luci'a, island of the British W. Indies (Windward Islands colony); area, 233 sq. m.; pop. (1907) 54,599; capital, Castries; is of volcanic origin, mountainous, and has a crater which emits sulphur fumes and, rarely, flames. Sugar and cacao are the principal products and exports. St. Lucia was long disputed by the French and British; the latter have held it permanently since 1803.

Saint-Marc Girardin (săn-măr' zhē-răr-dăn'). See GIRARDIN, FRANÇOIS AUGUSTE SAINT-MARC.

Saint Martin (măr-tăn'), **Louis Claude** (Marquis de), best known under his pen name of LE PHILOSOPHE INCONNU, 1743–1803; French mystical philosopher; b. Amboise; served in the army until 1771; then devoted himself to the study of theology and philosophy, especially Swedenborg, Böhme, and other mystics, and the dissemination of their teachings; author of "On Errors and on Truth," "On the Spirit of Things," "Natural View of

the Relations between God, Man, and the Universe," and other works.

Saint-Martin, Louis Vivien de. See VIVIEN.

St. Martin, island of the W. Indies, in the Caribbee chain; area, 37 sq. m.; is mountainous, but less than 1,400 ft. high; fertile, and has a salubrious climate. By an arrangement originally made, 1648, this island is nearly equally divided between France and the Netherlands; the French portion is a dependency of Guadeloupe; the Dutch portion is attached to Curaçao. Pop. (1901) 6,916.

Saint (sānt) **Ma'ry's Strait, or Riv'er,** connecting link between lakes Superior and Huron; forming the boundary between Ontario, Canada, and the upper peninsula of Michigan; has a general SE. course of 63 m. One mile below Lake Superior are the rapids known as St. Mary's Falls, or Sault de Ste. Marie, having in ¾ m. a fall of 22 ft. A ship canal around them was completed, 1855, by the State of Michigan. The canal was 5,400 ft. long and provided with two locks, each 350 ft. long, 70 ft. wide, and would allow the passage of vessels drawing 12 ft.; cost, $1,000,000. In 1870 the U. S. Govt. began the enlargement of the canal, and replaced the two locks originally constructed by a single lock, 515 ft. long, 80 ft. wide in the center and narrowing to 60 ft. at the gates; depth, 39½ ft., with a lift of 18 ft. and a depth of 17 ft. of water on the sills; total length of canal, 7,000 ft.; width, 180 ft.; and depth, 16 ft.; total cost, $2,150,000. The growth of commerce soon rendered this magnificent work inadequate, and still further enlargements were begun, 1887, and completed, 1896. The new lock occupies the site of the old state locks, and enters the canal just above the lock described above. It is 800 ft. long, 100 ft. wide, with a depth of water on the sills of 21 ft. and a lift of 18 ft. A canal with a lock 900 ft. long was opened, 1895, on the E. side of St. Mary's River, at the rapids, by the Canadian Govt.

St. Mau'rice Riv'er, one of the six great tributaries of the St. Lawrence, which it joins near the town of Three Rivers; has a course of 360 m.; drains an area of 16,000 sq. m.

St. Mi'chael, largest of the Azores; area, 300 sq. m.; pop. (1900) 125,183; most fertile and best cultivated of the group; chief towns, Ponta Delgada and Ribeira Grande.

St. Mihiel, a town of N. E. France, on the right bank of the Meuse and the Canal de l'Est, 23 m. S. by E. of Verdun by rail. It formerly possessed fortifications and two castles which were destroyed in 1635 during the quarrel between Louis XIII. and Charles IV., Duke of Lorraine. The town came into world-wide renown in Sept. 1918, when, in the first all-American offensive in the World War, the works were attacked, 12th, and the great salient on which the Germans had placed much dependence, was completely "smashed," 14th, and 16,000 prisoners and 443 guns captured. The day after the St. Mihiel salient was taken, General Pershing began his dispositions for the Argonne campaign of 42 days' duration.

St. Nazaire (sāñ nă-zār'), town of Loire-Inférieure, France; at mouth of the Loire; has a large and commodious harbor. As the navigation of the Loire has become difficult for large vessels on account of the amount of sand which it carries with it, St. Nazaire has become the chief entrepôt of the great traffic of this river. Pop. (1901) 35,813.

St. (sānt) **Nich'olas.** See NICHOLAS, ST.

St. Paul, chief of the Pribilof or Seal Islands, in Bering Sea; largest and most N. of the group; triangular in form; area, 32 sq. m.; highest point, Bogoslof, about 650 ft. above sea; pop., Aleuts, devoted to hunting seals; climate severe; potatoes and peas can be raised, and many swine are kept. Pop. abt. 250.

St. Paul, capital of State of Minnesota and of Ramsey Co.; on both sides of the Mississippi; sections connected by substantial highway bridges; is built on three plateaus, the lowest being the river flats; the second, the main plateau, on which the business portion and a part of the residence portion are built; and the higher, a range of irregular bluffs, on which are the principal residences. The city limits include 35,487 acres, within which lie the suburbs of Merriam, St. Anthony, Union, Groveland, Macalester, and Desnover parks, Arlington Hills, and others. There are thirty-one parks, with a total of 1,072 acres, including Como Park, with 425 acres. There are also 117 acres additional in parkways. The notable buildings are the state capitol (cost $4,500,000), city hall, U. S. Govt. building (cost $1,150,000), Pioneer Press, Manhattan, New York Life, Germania Life, and Globe Insurance companies, and Endicott office buildings. There are thirteen libraries. Educational institutions include Hamline Univ. (Methodist Episcopal), Macalester College (Presbyterian), St. Thomas's Seminary (Roman Catholic), St. Paul's Seminary (Roman Catholic), and Concordia College (German Lutheran); charitable institutions include two Roman Catholic orphan asylums, Protestant Orphan Asylum, Roman Catholic Infants' Home, Protestant Babies' Home, Day Nursery, Home for the Aged, Home for the Friendless, House of the Good Shepherd (Roman Catholic), Woman's Christian Home, St. Paul Bethel, and the Friendly Inn. Other benevolent institutions and societies are: Board of Control, Children's Home Society, Needlework Guild, Newsboys' Home Association, Parish Settlement, Free Dispensary, St. Vincent de Paul Society, Hebrew Relief Society, Society for the Relief of the Poor, Society for Prevention of Cruelty, St. Mary's Home, Young Women's Friendly Association, and City and County, Bethesda, St. Joseph's, St. Luke's, and Homeopathic hospitals. St. Paul does a large jobbing business (about $175,000,000 annually), the available trade area covering Minnesota, the Dakotas, Montana, Idaho, Washington, and N. Oregon, being 582,164 sq. m., with a pop. of over 5,000,000. It is the head of navigation on the Mississippi, and an important railway center from which extend seven E. trunk lines and four transcontinental systems; aggregate mileage of lines and systems, 55,667 m. Ac-

cording to U. S. census, 1909, there were 719 factory-system manufacturing plants, with 19,339 wage earners, and annual products, $58,990,000. The first house in St. Paul was built 1838; early settlers principally French, and engaged in the fur and whisky trade; Roman Catholic mission begun, 1841, from which the city takes its name; site surveyed 1847; settlement incorporated as a town and made the territorial capital, 1849; became city, 1854. Pop. (1910), 214,744.

St. Paul de Loan'da, or simply LOANDA, first settlement of the Portuguese (1578) in SW. Africa; capital of Angola; in Bengo Bay, near the mouth of the Bengo; is well adapted for commerce; largest town on the W. coast between Lagos and Cape Town. Loanda saw its most thriving days when it was the center of the slave export trade to Brazil. Public buildings and European residences are built of brazil wood, stone, or brick; steamers connect the port with the rich plantations on the Cuanza River.

Saint Paul's Cathe'dral, situated in the city of London, was completed in 1710 by Sir Christopher Wren and called his masterpiece. It is in the form of a Latin cross, 500 ft. in length, 118 ft. broad, and the transept is 250 ft. long. The upper part of the exterior is of the Composite, the lower of the Corinthian order. The vast interior is surmounted by a double dome; the inner dome is 225 ft., the outer one from the pavement to the top of the cross 364 ft. in height. Nelson, the Duke of Wellington, and Sir Joshua Reynolds, with Wren himself, were buried in St. Paul's, and a large number of the statues and monuments which it contains are memorials of distinguished men.

St. Pe'ter Port, capital of Island of Guernsey; old and picturesque town with many interesting buildings; among them the Government House, Elizabeth College, and Hauteville House, where Victor Hugo spent his exile (1856–70). The harbor, formed by two piers which inclose seventy-three acres, is a favorite resort of pleasure yachts. Pop. abt. 18,000.

St. Pe'tersburg (renamed PETROGRAD by imperial decree, Aug. 31, 1914) former capital of the Russian Empire, on the delta of the Neva, about 20 m. E. of its port, Cronstadt; location not favorable; climate severe; Neva covered with ice for five months, and with a mean winter temperature of 18° the thermometer is known to have fallen to —38°; elevation of site above the river is so small that, although both the river arms and the canals are lined with high stone quays, destructive inundations have taken place; To form a sufficiently solid foundation for the Nikolaievski bridges, three sets of piles had to be driven into the ground, one on the top of the other; and the foundation of the Church of St. Isaac is said to have cost $4,000,000. Nevertheless, Peter the Great, who founded the city 1703, and declared it his capital, 1712, and Catharine II, who was very solicitous for its growth and prosperity, succeeded in building up here one of the most brilliant capitals of Europe, and forming a commercial and industrial center of great importance.

The city consists of two parts—the Great Side (Bolshaya Storona), on the mainland, on the S. side of the Great Neva; and the Petersburg Side, on the numerous islands formed by the arms of the Neva, Vasili Ostrov, Volni, Petrovski, Citadel Island, Aptekarski, Krestovski, Kamennoi, and Velaginski. Only one permanent bridge leads across the Great Neva—the Nikolaievski, from the English quay in front of the admiralty building on the S. branch to the Vasili Ostrov shore. It is a magnificent structure of granite, 1,200 ft. long, resting on seven elegant arches, and was completed, 1850. The other bridges across the Great Neva are all temporary, supported on boats, and removed each autumn when the frost comes. The Annitchkoff bridge, across the Fontanka Canal, is also a splendid structure, 110 ft. long, decorated with four groups of wild horses. About 150 bridges connect the islands with one another. The Great Side is the more elegant part of the city, containing a great number of palaces, churches, government buildings, etc., all of which are of immense dimensions, generally gorgeously decorated, and often of a fine architectural effect. The Nevski Prospekt, leading in a SE. direction from Admiralty Square, is one of the finest streets in Europe, 130 ft. broad, 4 m. long, lined with palaces and planted with trees. The Petrograd Side is principally the seat of the commercial and industrial interests.

The most remarkable public building is the Church of St. Isaac, 330 ft. long, 290 ft. broad, 310 ft. high, built in the form of a Greek cross, entered from each side through a magnificent peristyle composed of twelve or sixteen monolithic columns of polished granite 60 ft. high and 7 ft. in diameter at the base, and surmounted by a dome rising 120 ft. above the peristyles, resting on thirty columns, covered with copper, and richly gilded. In the Church of St. Peter and St. Paul, whose elegant gilt spire rises 208 ft., and can be seen from all parts of the city, the Russian czars have been buried since the time of Peter the Great. In the Church of St. Alexander Nevski the body of this saint is preserved in a sarcophagus of solid silver. The Winter Palace, one of the largest palaces in the world, forms a square 455 ft. long, 350 ft. broad, contains immense wealth in its decorations and furniture, and is inhabited, when occupied by the czar, by 6,000 persons. The Hermitage, built by Catharine II, and connected with the Winter Palace, contains a famous picture gallery, collections of statuary, gems, vases, arms, a library of 120,000 volumes, a theater, etc. Of public squares, Admiralty Square is the largest. The Palace Square contains the Alexander column, 150 ft. high, whose shaft is a monolith 80 ft. high, of red granite. In Peter's Square stands a fine equestrian statue of Peter the Great.

Educational and benevolent institutions are numerous. The Imperial Library contains about 1,100,000 volumes and 35,000 MSS. The Academy of Sciences, founded by Peter the Great, has a library of 300,000 volumes, an excellent ethnographic museum, large numismatic and

anatomical collections, etc., and a botanical garden with the largest palm house in Europe. The university, founded 1819, is attended by over 2,000 students. The mining school has an unsurpassed collection of minerals. Many special schools and gymnasia for girls are established, and a number of compulsory elementary schools were opened, 1873. A celebrated institution is the foundling hospital. The manufactures, imperial and private, comprise glass, porcelain, and malachite ware, Gobelin tapestry and embroidery, arms, surgical and optical instruments, linen, woolen, cotton, and silk goods, paper, soap tobacco, etc. After the revolution and abdication of Nicholas II, (1917) several unsuccessful attempts were made to establish a stable government, but affairs rapidly drifted into chaos, and on Nov. 7, 1917, the city came under the full control of the Bolsheviki, when conditions daily grew worse. Pop. with suburbs (1915) 2,318,645. See RUSSIA.

St. Pe'ter's Church, basilica in Rome; consists of a Latin cross 613 ft. long and 450 ft. across the transept, surmounted by a dome 434¾ ft. above the pavement with a diameter of 195½ ft.; façade, 368 ft. long and 145 ft. high; building begun under Pope Nicholas V, after a plan by Rosselini, 1450, but work was neglected for nearly half a century; under Julius II, Bramante prepared a new plan, which was subsequently followed out in the main. Raphael had charge of the building for some time; Michelangelo designed the dome and nearly completed its erection; façade is by Carlo Maderno; the colonnade by Bernini. The church was consecrated by Urban VIII, November 18, 1626, the thirteen hundredth anniversary of the day on which St. Sylvester consecrated the basilica which originally occupied the site.

St. Peter's Sand'stone, deposit of friable white and yellow sandstone occurring principally in Wisconsin, but coming to the surface in the adjacent portions of Minnesota, Iowa, and Illinois; named from St. Peter's (now Minnesota) River, at the mouth of which it is well displayed; average thickness, from 80 to 100 ft., with a maximum of 212; is one of the minor divisions of the rocks deposited during the Cambrian period; rests on lower magnesian limestone, and is overlaid by Trenton limestone.

Saint-Pierre (săn-pē-ār'), **Charles Irénée Castel, Abbé de,** 1658–1743; French philanthropist; b. Barfleur, Normandy; was a member of the French Academy, chaplain to the Bishop of Orleans, and Abbot of Tiron; attended the Congress of Utrecht, and published "Projet de Paix Perpétuelle." In his "Discours sur la Polysynodie" he severely judged Louis XIV, and advocated constitutional government. He was expelled from the Academy, but expounded his views in the club de l'entresol, which became the nucleus of the future Academy of Moral and Political Sciences.

Saint-Pierre, Jacques Henri Bernardin de, 1737–1814; French author; b. Havre; passed through many vicissitudes; served as an engineer in the French and Russian armies, and, after adventures in Poland and Saxony, was for five years an engineer in the Isle of France, returning to Paris, 1771. Here he associated with Rousseau, was noted for his eccentricities, and, 1794, became Prof. of Morals at the Normal School; most celebrated works, the romantic tale, "Paul et Virginie," and "Études de la Nature."

St. Pierre (pē-ār'), former principal town and port of Martinique, French W. Indies; on a bay of the W. coast; had no harbor but a roadstead protected by the island itself except during hurricanes, when its exposed position made it dangerous; town was built partly on the beach and partly on picturesque hills; its botanical garden was one of the finest in the world; town, with its inhabitants (about 20,000), was completely destroyed, May 7, 1902, by eruption of the volcano Mont Pelée.

St. Pierre and Miquelon (mē-kė-lōn'), group of three islands and many islets at mouth of Gulf of St. Lawrence, near S. coast of Newfoundland, constituting a French colony; valuable only as a rendezvous for vessels engaged in the cod fisheries, of which some 1,500 annually enter the port; area, 91 sq. m. Pop. (1908) 6,000; capital, St. Pierre.

St. Privat (prē-vä'), **Bat'tle of.** See GRAVELOTTE, BATTLE OF.

St. Quentin (kŏn-tăn'), a city of N. France; on the Somme, 95 m. NE. of Paris; has extensive manufactures; contains an ancient Gothic cathedral and is surrounded by beautiful promenades. A battle took place here, August 10, 1557, between the army of Phillip II of Spain and the French, in which the French were defeated. During the Franco-German War, on January 19, 1871, the Germans defeated the French. In the World War it was early occupied by the Germans who pillaged and set fire to its cathedral, and looted and burned a large part of the city; reoccupied by the French, Oct. 1, 1918. The Hindenburg line was broken near the city. Pop. (1911) 55,571.

Saint-Saëns (-sŏn'), **Charles Camille,** 1835–; French organist and composer; b. Paris; obtained second organ prize, 1849; first, 1851; composed his first symphony when sixteen; organist of the Madeleine, 1858–77; composed largely in almost every art form; among operas, "Le Timbre d'Argent," "Étienne Marcel," "Henry VIII," "Ascanio," and "Phryne"; sacred cantata, "Samson et Dalila"; popular symphonic poems for full orchestra, "Le Rouet d'Omphale," "Phaëton," "Danse Macabre," and "La Jeunesse d'Hercule."

Saints' (sānts) **Days,** in the calendar of the Church, days set apart for the special commemoration of any saint. In the Roman Catholic Church the number of saints is very great, and a considerable number of saints are commemorated on each day of the year; but it is the custom to assign to particular countries, districts, or dioceses a certain number of saints for special commemoration. These saints' days constitute the calendar for that district. Any day not a saint's day in the local calendar, and not a festival nor a Sunday, is called a feria or vacant day; other days are either holy days of obligation, doubles, semidoubles,

and simples, according to the solemnity of the occasion and of the service for the day.

Saint-Simon (sănt-sē-mōn'), **Claude Henri** (Comte de), 1760–1825; French socialist; b. Paris; served in America, and distinguished himself at the siege of Yorktown; during the French Revolution made money by speculation in real estate, which he subsequently lost, and was in prison for eleven months. In 1801 he married Mlle. de Champgrand, from whom, in the hope of becoming the husband of the widowed Mme. de Staël, he was divorced, 1802. In 1807 appeared his celebrated "Introduction to the Scientific Labors of the Nineteenth Century," aiming at the reorganization of science and the reconstruction of society. With Augustin Thierry, his most devoted disciple, he published "The Reorganization of European Society." In "L'Industrie, ou Discussions Politiques, Morales et Philosophiques," Thierry, Saint-Aubin, and others assisted him. After a career remarkable for visionary schemes and struggles with adversity, he attempted to end his life, March, 1823; but the shot only destroyed one eye, and he survived to finish his "Industrial Catechism" and "The New Christianity," his chief work. His socialistic doctrines became known as St. Simonism.

Saint-Simon, Louis de Rouvroi (Duc de), 1675–1755; French writer of memoirs; after distinguishing himself in the army, left it 1702, but retained influence at court; strenuously opposed the Jesuits, and his suggestions for ending the Spanish War of Succession were partly adopted in the Peace of Utrecht. After Louis XIV's death, 1715, he aided the Duke of Orleans in obtaining the regency, and was a member of the council. In 1721 he negotiated at Madrid the marriage between the Infanta of Spain and Louis XV, but his opposition to Cardinal Dubois caused him to withdraw from public affairs. The first authentic and complete series of his "Mémoires," owing to his bold and pungent satires, appeared only, 1829–30.

Saint (sānt) **Thom'as**, island of the W. Indies, in the Virgin group; 30 m. E. of Porto Rico; belonging to Denmark; area, about 35 sq. m.; pop. (1901) 11,012; formed by a mountain ridge attaining an elevation of 1,480 ft. Charlotte Amalie, the only town, is built along the shore of an excellent bay on the S. side. Several regular steam lines touch here. A treaty for the annexation of the island to the U. S., 1867, though approved by the people of the island, failed in the U. S. Senate, and an attempt by Denmark, 1902, to cede the islands of St. Thomas, St. John, and St. Croix to the U. S. was defeated in the Danish Landsthing.

St. Thomas, a city and railway center in Elgin Co., Ontario, Canada. Five railroads pass through the city, which has manufactures of carriages, flour, dressed lumber, car wheels, knitted goods, and cigars. Pop. (1911) 14,054.

St. Vin'cent, Earl of. See JERVIS, SIR JOHN.

St. (sĕnt) **Vincent**, island of the Windward Islands colony, British W. Indies; between St. Lucia and the Grenadines; area, 133 sq. m.; is mountainous, with fertile valleys, and half the surface still covered with forest; near the N. end is a volcano, the Soufrière, formerly with two craters, one of which was occupied by a deep lake; its eruptions have twice devastated a great part of the island: April 27 to May 1, 1812, and the week of May 7, 1902, simultaneously with the terrible eruption in the island of Martinique. The island was the last stronghold of the W. Indian Caribs, who were finally conquered by the British, 1795–96, and transported to Ruatan in Bay of Honduras; a few returned, and now have a small reservation; pop. (1908) estimated at 51,779; capital, Kingstown. The Grenadines, except Carriacou, are dependencies.

St. Vincent, Cape. See CAPE ST. VINCENT.

St. Vi'tus Dance, or Chore'a, disease characterized by irregular, involuntary, and often grotesque muscular action, without appreciable organic change in any tissue, and generally without pain or any known derangement of mental action or of sensation. It is most common in children after the second dentition and before puberty; much more common in girls than in boys; sometimes attacks adults, though some cases once called adult chorea are now recognized as locomotor ataxia. Chorea is sometimes hereditary, sometimes epidemic. Many writers have classed the dancing mania (the original "St. Vitus's dance"), tarantism, and the excesses of certain religionists (dervishes, French prophets, "jumpers," and "convulsionists") as varieties of chorea. Stammering has been called a chorea of the vocal organs. The disease is sometimes associated with rheumatism and generally with anemia. The metallic tonics are useful, and so are systematic gymnastics, life in the open air, and a kind and unobtrusive discipline, which shall teach the young patient the power of the will over the movements of the body.

Sakhalin (sä-khä-lēn'), known as KARAFUTO by the Japanese and as TARAIKO by the natives, long, narrow island off the E. coast of Asia, stretching directly S. from the mouth of the Amur River; length, 670 m.; breadth from 15 to 80 m.; area, 29,336 sq. m.; is traversed by parallel mountain chains, thickly wooded, the highest peak being Ktönspal (La Martinière), near the center of the island, 4,860 ft. high; chief productions, coal of good quality, furs, and timber; climate and soil do not favor agriculture. At Dui on the W. coast, and Mauka Cove farther S., are government penal stations; the last is also a fishing center. After 1875, when Japan ceded her rights over the S. portion of the island, Sakhalin was altogether Russian till, by the Treaty of Portsmouth (1905), after the Russo-Japanese War, Russia ceded to Japan the S. half of the island. The pop. (1907) was abt. 18,000.

Sa'la, George Augustus Henry, 1828–95; English journalist and author; b. London; educated as an artist, but early devoted himself to literature; contributor to Dickens's *Household Words* and other periodicals, especially *The Illustrated London News* and *The Cornhill Magazine*; visited the U. S., 1863–64, as correspondent of *The Daily Telegraph*, and

published "America in the Midst of War"; represented the same paper in Algeria, 1864, and again, 1875; at the Paris Exposition, 1867; on the Continent during the Franco-German War, 1870–71; and in Spain, Morocco, and Venice, 1875. He published several novels, "Quite Alone," "Captain Dangerous," etc.; works of travel, etc., including "Paris Herself Again," "America Revisited," "London Up to Date," and was the founder and editor of *Temple Bar* magazine. He visited the U. S., 1885, and lectured in its principal cities on his way to Australia, which he visited as correspondent of *The Daily Telegraph*.

Salaam' (Arabian, *salām*, "peace," "safety"), Oriental salutation, of which there are various forms, mostly accompanied by the words meaning "Peace be with you!" and sometimes by an inclination of the body. Strict Mohammedans never give the salaam to an unbeliever.

Sal'adin (Arabian, SALA'H-UDDIN USAF), 1137–93; Sultan of Egypt and Syria; son of Ayub, a Kurd in the service of Noureddin, sovereign of Syria; 1163, accompanied his uncle Shirkuh to Egypt, where he displayed great military capacity. On the death of Shirkuh, 1168, his authority as Noureddin's lieutenant devolved on Saladin. The death of Noureddin, 1173 or 1174, left him absolute master of Egypt. He conquered Syria in two expeditions, and by 1185 his empire extended from Tripoli in Africa to the Tigris, and from Yemen on the Arabian Sea to the Taurus, the Latin Kingdom of Jerusalem being alone independent of him. He invaded the Holy Land, 1185; overthrew the Christian army at Tiberias, 1187, and took Acre, Acalon, and other towns; and October 2, 1187, Jerusalem surrendered to him after a siege of two weeks. In the third crusade he thwarted for two years (1189–91) every attempt to retake Acre, but it finally capitulated. Ascalon also fell, and the crusaders, 1192, advanced within a day's march of Jerusalem, but were induced by dissensions in their own ranks to retreat. Saladin divided his estates among his seventeen sons and his brother Malek-el-Adil. His fame was deservedly great. Magnanimous and just, skillful and intrepid in war, judicious and far sighted in civil affairs, the founder of a vast and wisely administered empire comprising Egypt, Syria, Mesopotamia, Palestine, and Arabia, he is the hero of Mussulman chivalry.

Salado, Rio (rē'ō sä-lä'dō), river in N. of Argentina; rising in the Andes of Salta and flowing with a general SE. course to the Paraná, it coincides nearly with the SW. side of the region called the Gran Chaco; length about 1,000 m.; is shallow and not navigable.

Salaman'ca, town of Spain; capital of the province of the same name; on the right bank of the Tormes, which is here crossed by a magnificent bridge of twenty-seven arches. It is surrounded with old walls, but several portions within the walls have been in ruins since the occupation of the city by the French in 1812. The streets are mostly steep, narrow, crooked, and dark, but they are often lined with lofty edifices most interesting in architectural respects. The university was founded in 1200. It is the first institution of its kind in Spain, and enjoys a high reputation all over Europe. Pop. (1900) 25,690.

Sal'amander, any one of numerous forms of tailed amphibians; are small and of lizardlike form, and are terrestrial as distinguished from the aquatic newts; inhabit damp, shady places, and feed mostly on worms, slugs, snails, insects, etc. *Salamandra maculosa* is the common

COMMON EUROPEAN SALAMANDER.

spotted salamander of central and S. Europe. The black salamander (*S. atra*) is Alpine. The salamander has been popularly identified with the fabulous animal supposed to be able to live in or to extinguish fire. The salamander of Marco Polo was asbestos. The animal locally known in the S. parts of the U. S. by the name is a pocket gopher (*Geomys tuza*), a rodent.

Sal'amis (modern KULURI), island of Greece, in Gulf of Ægina, near Attica, from which it is separated by a narrow channel; 10 m. W. of Athens; area, about 30 sq. m.; chief town, Kuluri, on the W. shore. On the E. shore are the ruins of the ancient city of Salamis. Salamis is said to have been made a kingdom by Telamon, father of Ajax. It was celebrated for the great naval victory of the Greeks under Themistocles over the fleet of Xerxes, 480 B.C. Salamis was also the name of an ancient city of Cyprus, on the E. coast, the most important in that island, ruins of which are still visible at Old Famagusta. Pop. abt. 4,000.

Sal Ammo'niac. See AMMONIA.

Salayer (sä-lī'ėr), or **Saleyer** (sä-lā'yär), **Is'lands,** group of about thirty small islands S. of Celebes, E. Indies; area, 265 sq. m.; pop. 80,000, consisting of Mohammedan Malays, ruled by native chiefs, but subject to the Netherlands. Cotton, coffee, sugar, pepper, and mustard are cultivated; also maize and botta (a kind of millet), but not rice, on account of certain superstitious ideas of the natives. Fine timber, both sandal and teak, abounds.

Sale, George, abt. 1690–1736; English Orientalist; b. probably Kent; became a lawyer; wrote the Oriental biography and criticism for Dr. Thomas Birch's translation of Bayle, entitled "A General Dictionary, Historical and Critical," and executed a still unrivaled trans-

lation of the Koran, to which he prefixed a scholarly "Preliminary Discourse" on Arabian history, manners, customs, and religion before Mohammed.

Sale, Sir Robert Henry, 1782–1846; British military officer; popularly known as the hero of Jellalabad; b. England; entered the army at thirteen; engaged in storming of Seringapatam, 1799; storming of Travancore lines, 1809; capture of Mauritius, 1810, and in Burmese War, 1824–25; appointed, 1838, to command the first Bengal brigade in army on the Indus, which constituted the advance guard of the expedition against Afghanistan; commanded the storming party at Ghazni, July 23, 1839, where he was severely wounded; knighted and promoted to major general the same year; subdued the Kohistan country, 1840; captured several fortresses; defeated Dost Mohammed Khan at Purwan, obliging him to surrender. In evacuating Afghanistan, 1841, he had to fight his way through the Khurd, Kabul, and Jagdalak passes and other strongholds, but was compelled to retreat on Jellalabad, where he was besieged by Akbar Khan from November 12, 1841, to April 9, 1842, when he attacked and utterly routed the Afghans, capturing guns, ammunition, and camp—a feat which procured him the thanks of Parliament and the highest military reputation; took part in action of Tezen and the recapture of Kabul, and in Punjab campaign of 1845 as quartermaster general, but was mortally wounded at battle of Mudki.

Sale, in law, a contract to give and transfer rights of property for money, which the buyer pays or promises to pay to the seller for the thing bought and sold. The word is often applied indifferently to the transfer, for a consideration, of both real and personal property; but technically it applies only to personal property, the transfer of real property being a grant or conveyance. Three things are necessary to constitute a valid sale at common law, *viz.*: the thing to be sold, the price to be paid for it, and the agreement or consent of the contracting parties that the property in the subject-matter should pass from the vendor to the vendee, for the stipulated price given or promised to be given by the vendee. The thing sold must be in actual existence at the time of the sale, otherwise the sale will be invalid. The price must be certain, or so referred to a standard that it may be made certain; and the thing sold must be capable of identification. A seller has not only a lien for the price of the goods while in possession, but he may, in the event of the insolvency of the purchaser, retake the goods *in transitu*, the price being unpaid. A sale without delivery is not valid, in general, against a third person who buys without notice; but as between seller and purchaser, delivery is not necessary to complete the bargain. Whenever, in a contract of sale, it is agreed that some particular act shall be done in relation to the thing sold, by either party, this makes a conditional sale. If a person steals goods and sells them, the property remains in the rightful owner. See BARGAIN AND SALE.

Sale, Bill of. See BILL OF SALE.

Sa'lem, town of British India; capital of district of same name in presidency of Madras; on the Toiromanni, 1,070 ft. above sea; has a railway station, is well built, and has important cotton and silk manufactures. Pop. (1901) 70,627.

Salem, chief capital of Essex Co., Mass.; on Massachusetts Bay, 16 m. NE. of Boston; on a peninsula between two arms of the sea, with an excellent drive along the N. shore; has a commodious, sheltered harbor, a refuge for coasting vessels in storms; three public parks—Washington Square, of eight acres, in the center of the city; Mack Park, in N. Salem; and The Willows, of thirty acres, 1 m. E. on the Neck Shore. Salem merchants early established fishing industries; 1670, sent vessels to the W. Indies and Europe; and immediately after the Revolutionary War opened trade with China, India, Java, Sumatra, the Philippines, Arabia, Cape of Good Hope, Russia, S. America, and other foreign parts.

For many years the city was noted for its large foreign trade, and at one time had almost the monopoly of the E. India and China trade; but it no longer has a foreign commerce. There is a large coasting trade, and an immense tonnage of coal is here landed for transshipment to interior cities. There are a few buildings typical of the period of 1634–1700; public library, Essex Institute, Peabody Academy of Science with museum of ethnology (including an E. India marine museum dating from 1799), and Athenæum. Salem was settled by Roger Conant and the "Old Planters," 1626. Endicott, with a second charter, came 1628. Banished by the magistrates, against the wishes of his people, Roger Williams went from Salem to settle Rhode Island, 1636. In 1692, as the result of the witchcraft delusion in Salem village (Danvers), nineteen persons were hanged by order of the court, appointed by the royal governor, sitting in Salem. Here, too, the awakening first occurred, and, 1693, all convicted and accused persons were set free. In the Revolution the first provincial assembly sat here, 1774; the first armed resistance to British authority (Leslie's Retreat) occurred at the N. bridge, February 26, 1775; and Salem furnished large numbers of troops and 158 armed privateers. The U. S. frigate *Essex* was built in Salem, 1799. In the War of 1812–15, 40 of the 250 American armed vessels went from Salem. Pop. (1910) 43,697.

Salem, city (founded by Moravians, 1766); Forsyth Co., N. C.; adjoining Winston, the railway station and banking place; 112 m. W. of Raleigh; center of important movements in the early Indian and the Revolutionary wars; visited by Union and Confederate armies in Civil War; seat of Salem Female Academy (Moravian), which retains its original name, although it has become one of the leading colleges for women in the S. states; manufactures comprise cotton and woolen mills, tobacco factories, and ironworks. Pop. (1910) 5,533.

Salem, capital of State of Oregon and of Marion Co.; on the Willamette River; 53 m.

S. of Portland; in farming and fruit-growing region; laid out with streets 100 ft. wide, and blocks 330 ft. square, with 16-ft. alleys; one of the handsomest cities on the Pacific coast. The city contains two public parks, state, Masonic, and two educational libraries; Willamette Univ. (Methodist Episcopal), Academy of the Sacred Heart (Roman Catholic), Friends' Institute, State Penitentiary, Reform School, Deaf-mute School, Institute for the Blind, Insane Asylum, and Orphans' Home. A Methodist mission was established 9 m. below the present city, 1834; city incorporated, 1853; became state capital, 1860. Pop. (1910) 14,094.

Salera'tus, a somewhat impure and imperfectly carbonated bicarbonate of potash, made by exposing a concentrated solution of neutral potassic carbonate to an atmosphere of carbon dioxide proceeding from fermentation or other source; hence the name. The finely granular form of the commercial article is probably a result of agitation during the absorption of the carbonic acid. Medicinally, a purer crystalline bicarbonate of potash is used, which is, or should be, fully charged with two equivalents of carbonic acid for one of potash. Saleratus was at one time extensively used as an article of domestic consumption, but has been displaced by bicarbonate of soda, known as cooking soda.

Salerno (sä-lĕr'nō), ancient *Salernum*, capital of province of Salerno, Italy; 33 m. SE. of Naples; on Gulf of Salerno; chief object of interest, the old Norman cathedral (1084), restored 1768, the most imposing specimen of Norman architecture in S. Italy, and containing, besides rich marbles and mosaics, twenty-eight magnificent granite and porphyry columns from the temples of Pæstum. Tradition asserts that the body of St. Matthew was brought from the East, 930, and deposited in the crypt of the cathedral. Salerno was originally a Roman colony; became the capital of a principality in the ninth century, and, 1077, was taken by Robert Guiscard, who made it his capital. Pop. (1901) 42,727.

Sales, Francis de. See FRANCIS OF SALES.

Saley'er Is'lands. See SALAYER.

Sa'lians. See FRANKS.

Sal'icin, bitter crystalline principle contained in the bark of all the willows and some poplars; has no alkaloid properties, like quinine, strychnine, and some other crystalline bitter principles, but is a glucoside. Salicin has valuable medicinal virtues in the treatment of intermittents, though much less efficient than quinine, and in dyspepsia and acute rheumatism.

Sa'lic Law, law of the Salian Franks, who established a Frankish kingdom in Gaul in the fifth century; especially that provision of the Salic code which prevents women from inheriting any landed estate not an acquired but inherited possession in the family. This principle was appealed to in France in the controversy between Edward III and Philip of Valois, with respect to the inheritance of the crown; and in Spain, where previously the Visigothic law prevailed recognizing the succession of women, it was introduced by the Bourbon, Philip V, 1713, but abolished by Ferdinand VII, 1830, in favor of his daughter Isabella. In accordance with a similar law the crowns of Great Britain and Hanover became separate, 1837.

Salicyl'ic Ac'id, product of salicine, carbolic acid, and other substances, especially the essential oil of wintergreen. When salicylol is acted on by chromic acid or potassium hydrate, it becomes oxidized, forming potassium salicylate, with evolution of hydrogen. The potassium salicylate is decomposed by the action of hydrochloric acid, liberating salicylic acid, with production of potassium chloride. Salicylic acid may also be formed by passing dry carbon dioxide into warm phenol (carbolic acid), to which at the same time are added small pieces of sodium. The reaction forms sodium salicylate, from which salicylic acid may be obtained by the action of hydrochloric acid. In very small quantities it acts as an antiseptic, and experiments have shown its efficiency in preserving wines, beer, eggs, and other articles of food from the changes which unfit them for use. It cannot, however, be used for milk and butter, as it gives them a peculiar taste. Experiments in the preservation of meat gave unsatisfactory results. Its action as a disinfectant is not so powerful as that of carbolic acid. On account of its being odorless and less irritating than carbolic acid, and not poisonous, it has been used with advantage in surgical treatment, where it can be used for every purpose for which carbolic acid is used, except for the cleansing of instruments. In medicine, salicylic acid is used as an antipyretic, and as an internal factor as antiseptic in cases of diphtheria. It has come into extensive use in the manufacture of dyestuffs. Certain azo colors obtained by its use are much prized as yellow and orange dyes.

Salien'tia, that order of batrachia which contains the frogs and toads, and which, from the fact that in the adults the tail is lacking, is better known as *Anura*. Some of the *Salientia* are aquatic (frogs), some (toads) are terrestrial, going into the water only for the purpose of egg laying in the spring, and still others (tree toads) live in trees and bushes, and have the tips of the toes modified into sucking disks to insure a firm hold on the branches upon which they dwell. The typical toads are especially developed in tropical America, Africa, and Asia; the true tree frogs and related forms are most abundant in Australia and tropical America; and the typical frogs are most numerous in tropical Asia and Africa.

Sali'na Group, American geological formation of upper Silurian age, otherwise known as the Onondaga salt group; consists of red and green shales and impure limestone, containing large masses of gypsum; best developed in central New York, where it is about 1,000 ft. thick and forms an E. and W. belt averaging about 10 m. broad, passing through Syracuse; is the source of brine from which 8,000,000 to 12,000,000 bu. of salt are made annually.

Salisbury (sâlz'bĕr-ĭ) (Marquises of, Earls of, Viscounts Cranborne [1604], and Barons

Cecil [1603]), prominent family of the British nobility. The earldom of Salisbury was first held by WILLIAM LONGESPÉE, a Norman noble (d. 1226), afterwards by the Montacute family, of which THOMAS, the fourth and last earl, was distinguished in the wars against France (d. 1428). The title was conferred anew on SIR RICHARD NEVILLE on his marriage to Alice Montacute, daughter of Thomas (1442). This nobleman was a prominent Yorkist leader, gained the victory of Bloreheath, 1459, and was beheaded at Pontefract, January 1, 1461, by order of Queen Margaret, the day after the battle of Wakefield, in which he was taken prisoner. Subsequently, the title was borne by MARGARET PLANTAGENET, mother of Cardinal Pole, who was beheaded as a pretender to the crown, 1541. ROBERT CECIL, famous Secretary of State to Queen Elizabeth; b. 1550; continued the policy of his father, Lord Burleigh, devoting much attention to the domestic interests of the country, and in foreign affairs striving to prevent Spain from gaining an undue ascendency. He is noted as the enemy of Essex and of Raleigh, and seems to have felt an unworthy jealousy of his cousin, Lord Bacon. He was made Earl of Salisbury, 1605, and the title still remains in his family, the marquisate having been added 1787.

Salisbury, Robert Arthur Talbot Gascoyne Cecil (Marquis of), 1830–1903; British statesman; b. Hatfield, England; sat in Parliament first as Lord Robert Cecil, and later as Viscount Cranborne, from August, 1853, until his accession to the marquisate, April, 1868; became Secretary of State for India, 1866; resigned, 1867, in consequence of unwillingness to support the Reform Bill, and accepted the same post in 1874; succeeded Lord Derby as Minister of Foreign Affairs, 1878; one of the British plenipotentiaries at Congress of Berlin. For the next six years he maintained a vigorous opposition to Gladstone, and succeeded in checking the Liberals in their Irish policy. From June to November, 1885, he was Prime Minister and Secretary of State for Foreign Affairs, and again from August, 1886, to August, 1892, when the question of Irish Home Rule wrecked both the ministry and the party. On defeat of the Rosebery government, June, 1895, the premiership fell once more to Lord Salisbury, who formed a strong coalition ministry, in which many prominent Liberal-Unionists found places; resigned, July 14, 1902. A vigorous foreign policy characterized his administrations.

Sa'lishans, members of a linguistic family of N. American Indians; also called SELISH or SALISH and FLATHEAD INDIANS; comprising over fifty-eight tribes, including the Bellacoola or Bilqula, Calispel, Chehalis, Colville, Cowlitz, Lummi, Nanaimo, Nestucca, Nisqualli, Okanagan, Puyallup, Skagit, Skitsuish or Cœur d'Alene, Spokane, and Tillamook; formerly living on the Oregon coast, the NW. part of Washington, E. Vancouver Island, basin of the upper Columbia, and part of the present Montana; now on reservations in British Columbia and Washington State; less than 20,000 in all.

Sali'va, the liquid secretion of the mouth. It comes from several glands secreting different liquids. It has an alkaline reaction, and contains a ferment ptyaline, which converts starch into sugar, thus assisting in its digestion. For this reason it is claimed that young infants, whose lack of teeth renders mastication impossible, and who swallow their food without admixture with saliva, should not be fed upon starchy food. On the other hand, it is asserted that ptyaline acts only in alkaline liquids, and that in the acid liquid of the stomach it is therefore inert. Saliva, very curiously, contains sulphocyanide of potassium in minute but readily detectable quantity, It contains about one per cent of solid matter, of which as much as one fifth in some cases is made up of saline substances. The amount of saliva secreted per diem varies widely in different persons and in the same person at different times.

Sal'ivary Glands, the glands which secrete saliva. In man they are three in number on each side: (1) The parotid, the largest, situated beneath the skin and immediately below the ear; (2) the submaxillary, beneath the lower

SALIVARY GLANDS.

jaw; (3) the sublingual, under the tongue. These glands are composed of a number of sections or lobes of polygonal shape and flattened sides. The structure is termed racemose, from its resemblance to that of a bunch of grapes. The tree or stemlike framework upon which the glandular lobes are set is a system of excretory tubules, which take up the saliva secreted by the gland, and the trunk is a common duct conveying it through the deep tissues to the surface of the mouth. The parotid has one large duct, the duct of Steno; the submaxillary, the duct of Wharton; the sublingual—from eight to twenty minute ducts opening independently beneath the tongue—the ducts of Rivinius; and a few uniting to form a single duct, the duct of Bartholin, which joins that of Wharton. The process of secretion, more or less constant, is most active during the mastication of food; then saliva is

abundantly formed and poured into the mouth. The salivary glands are the seat of disease—mumps (*q.v.*), or parotiditis, a specific inflammation of the parotid; inflammation and abscess of the parotid in low fevers; deposits of diphtheritic infiltration in some cases of that disease; not infrequently concretions of chalky matter form in the glands.

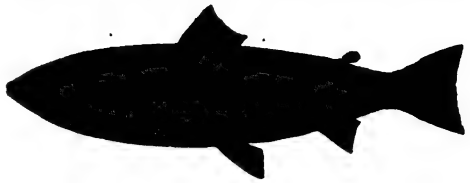
Saliva'tion, a specific irritation of the salivary glands, mouth, and throat. Though most frequently due to mercury, it may be caused by other drugs, as iodine, and may occur in certain diseases. In former years mercury, in heroic doses, ranked as a remedy second only to blood-letting. Salivation, though now rare, was then a frequent occurrence—intentionally produced in many cases, in others the accidental result of large doses and individual susceptibility. Salivation is manifested by a metallic taste, by soreness of the gums, tenderness of the jaws and teeth when pressed together or closed with force, excessive flow of saliva, even dribbling from the mouth; swollen, red, ulcerated gums; swollen, coated, salvy tongue, taking the imprint of the teeth, and a foul "mercurial" breath.

Sal'lust (Caius Sallustius Crispus), 86–34 B.C.; Roman historian; b. Amiternum, country of the Sabines; belonged to a plebeian family; about age of twenty-seven obtained the quæstorship; 47, was prætor; 46, accompanied Cæsar in his expedition to Africa; appointed governor of Numidia; acquired an immense fortune by plundering the inhabitants; wrote "Bellum Catilinarium," a history of the conspiracy of Catiline; "Bellum Jugurthinum," a history of the war against Jugurtha; and "Historiarum Libri V," comprising the period between 78 B.C., the year of Sulla's death, and 66, and forming with the other two works a connected history of Roman affairs for forty-five years. The last exists only in a few fragments.

Salma'sius, Claudius (Claude de Saumaise), 1588–1653; French scholar; b. Semur-en-Auxois; was a Protestant and professor at Leyden; at instigation of Charles II, then a refugee in Holland, he wrote, 1649, "Defensio Regia pro Carolo Primo," which led to Milton's celebrated reply, "Pro Populo Anglicano Defensio" (1650); most important work, "Plinianæ Exercitationes in Solinum" (1629).

Salmon (săm'ŭn), common name of the soft-rayed fishes of the genus *Salmo*. The names salmon and trout have been applied in the most indefinite manner to the fishes of this genus. At the head of the true salmons, or those having the body of the vomer smooth, stands the common salmon (*S. salar*), which are generally not more than 3 ft. long, though they attain a greater size. They are of anadromous habits, *i.e.*, they ascend from the sea to fresh water to breed.

The salmon has been known to spring 14 ft. out of water, and to describe a curve of at least 20 ft. to surmount a cascade; if not successful at first it perseveres till it succeeds, unless the obstruction be insurmountable. Having attained the requisite height, as the cold weather comes on they deposit their spawn. The process consumes from eight to twelve days, after which the fish are much emaciated, and retire to some quiet place to regain their strength; they are then called kelts, and are unfit for food. This species is very extensively distributed in N. Europe and America. It does not occur in rivers falling into the Mediterranean, and does not come below the forty-fifth



Common Salmon.

parallel of latitude; in N. America it frequents the rivers of Labrador, Canada, Newfoundland, Nova Scotia, New England, and those of New York communicating with the St. Lawrence, ascending even to Lake Ontario.

The salmon is voracious and grows rapidly; in the sea it feeds principally on small fishes, especially the sand eel, crustaceans, etc. In the sea salmon very rarely bite at a hook, but in rivers and estuaries they will rise to artificial flies. The flesh is delicate, and of a pink which has received the name of salmon-colored.

Salmo'neus, in Grecian mythology, son of Æolus, founder of the Æolic race; emigrated from Thessaly to Elis, where he founded the city Salmone; boasted himself equal of Zeus; usurped his functions, and attempted to imitate the thunder and lightning; was therefore slain by the bolt of Zeus, who also destroyed Salmone.

Salmon'idæ, one of the most important families of fishes, containing the salmon, trout, whitefishes, etc., alike famous for their gameness and for their food qualities. The family contains about eighty species arranged in ten genera, of which *Salmo*, *Oncorhynchus*, *Salvelinus*, and *Coregonus* are the most important. The first three mentioned form the *Salmones* of the older authors, and contain the forms commonly known as salmon, trout, and charr. The genus *Oncorhynchus* includes the Pacific coast salmon, five species in all. The genus *Salmo* includes the salmon of Europe and E. N. America, and the true trout as well, while *Salvelinus* contains the red-spotted trout or charr.

Sal'mon Trout. See Trout.

Salm-Salm (zälm-zälm), **Felix** (Prince), 1828–70; soldier of fortune; b. Anholt, Prussia; became an officer successively in the Prussian, Austrian, and American (Civil War) armies; aid and chief of household to Emperor Maximilian in Mexico; captured at Querétaro, but released after emperor's execution; reëntered Prussian service at outbreak of Franco-German War; killed at Gravelotte. In 1862 he married Mlle. Agnes Le Clercq, a native of Baltimore and actress by profession, who accompanied him in Mexico, and acquired celebrity by her

heroic efforts to procure the pardon of Maximilian or to effect his escape. She accompanied her husband during the Franco-German campaign up to his death; published portions of her own and of her husband's diaries in Mexico, and issued, 1875, an interesting volume, "Ten Years of My Life."

Sal'ol, substance sometimes called the salicylate of phenol, introduced into medicine, 1886; is a compound of salicylic and carbolic acids; occurs as a white, crystalline powder, with a faint odor and a slightly soapy taste, and when taken in the body is not dissolved in the stomach, but in the alkaline pancreatic juice of the duodenum; used in treatment of rheumatism and allied affections with some success, and also as an intestinal antiseptic in cholera, etc.

Salomon', Louis Étienne Félicité, 1820–88; Haitian general and politician; b. Aux Cayes; was a negro; one of Soulouque's ministers; commanded army, 1855–59, when Soulouque was deposed and Salomon fled from the island; after various attempts to incite revolts, returned 1879, and was elected President, governing until August, 1888, when he was deposed by a revolution; republic during this period was unusually prosperous.

Sal'omon Is'lands. See SOLOMON ISLANDS.

Salo'na, ancient capital of Roman province of Dalmatia; city of great importance in both commercial and military respects. The Emperor Diocletian was born here, and 3 m. to the SW. he built, 303 A.D., the famous palace, covering eight acres, to which he retired after his abdication. The city and the palace were destroyed, 641, by the Avars, but on the site of the palace and out of its ruins arose the modern town of Spalato.

Saloni'ca, capital of the former Ottoman vilayet of Salonica, which nearly corresponded to the ancient Macedonian; rising amphitheatrically on Mount Kortiasch from the NE. shore of a fine harbor of the Gulf of Salonica; rebuilt on the site of a city named Therma by Cassander, who named it Thessalonica in honor of his wife, the sister of Alexander the Great; after the battle of Pydna (168 B.C.) it became capital of the Roman province of Macedonia; 15,000 citizens were massacred by order of Theodosius (390); it was pillaged by the Saracens (904); taken by the Marquis of Montferrat (1204), who founded the Empire of Salonica; and conquered by the Ottomans (1430). The massacre of two foreign consuls by a Mussulman mob on May 6, 1876, contributed to bring on the Russo-Turkish War of 1877-78. As a result of her war with Turkey, 1912-13, and with Bulgaria, 1913, Greece acquired 16,919 sq. m. of new territory in which Salonica was included. In the early part of the World War the city was selected as one of the points of assemblage of an Allied military and naval expedition against Constantinople *via* the Dardanelles, but through alleged maladministration the movement proved a costly failure. At the chief station on the Via Egnatia, which connected the E. provinces with Rome, it was to St. Paul a center for the dissemination of Christianity, and to it he addressed two epistles. Salonica has manufactures of morrocco leather, silk and cotton, and large exports, especially of tobacco, that called Yenidji being esteemed the finest raised in Turkey. Pop. (1915), 157,889.

Salsette', island of British India; area, 240 sq. m.; pop. abt. 110,000; connected with island of Bombay by a causeway and a stone bridge, and famous for the immense rock-cut cave temples found at Kenery in the center of the island and at several other places. The island was held by the Portuguese from early in the sixteenth century till 1739.

Sal'sify, Oys'ter Plant, or **Veg'etable Oyster,** European plant (*Tragopogon porrifolius*) of the family *Compositæ*; cultivated for the roots, which are long, tapering, and have, when properly cooked, a taste somewhat like that of the oyster. The goat's beard (*T. pratensis*), with yellow flowers, is an introduced weed in E. parts of the U. S.

Sal So'da. See SODA.

Salt, sodic chloride, sea salt, or common salt. It occurs abundantly in nature, both in the solid state, as rock salt, and in solution in sea water, salt lakes, and springs. The open ocean contains on an average 33.8 parts of salt in 1,000, of which 26.8 in 1,000 are common salt, equal to about 4 oz. in a gallon. Landlocked seas like the Gulf of Mexico or the Mediterranean Sea contain more salt than the open ocean. Salt is a compound of one atom of chlorine combined with one atom of sodium; symbol, NaCl; molecular weight, 58.5. It is rarely obtained pure.

Geographically salt is widely distributed. Excepting Norway, Denmark, and Holland, the European countries are all provided with salt to some extent from domestic sources. Russia is almost the only country which derives large supplies from salt lakes. France, Spain, Portugal, and Italy are the principal producers of sea salt. The salt mines of Wieliczka, 7 m. SE. of Cracow, extend over a space of about 2 m. in length by nearly 1 m. in breadth, and are about 1,000 ft. in depth. England obtains her supply almost exclusively from mines and springs, principally in Cheshire and Worcestershire. The Cheshire salt is mostly obtained from wells of 200 to 250 ft. depth, terminating in the lower bed of rock salt. In Siberia and Tartary plains are covered with saline incrustations. Lake Urumiah, 90 m. long and 20 to 30 m. broad, contains brine of extraordinary strength, the percentage of pure salt being 18.116. The salt wells of China are remarkable for their great depth and immense numbers. Africa contains extensive tracts of salt lands and beds of rock salt in the desert of Sahara, particularly in the N. and W. portions. The trade in salt with the Sudan furnishes a support for many of the inhabitants of the desert.

In S. America, rock salt is found in Brazil, Peru, Colombia, and Venezuela; in the pampas of the S. and the elevated plains of Peru, it occurs as an incrustation; in Patagonia and Argentina are productive salt lakes; in Colom-

bia it is obtained from springs, and in Brazil from lagoons on the coast. The beds of various salts in the elevated plains of Tarapacá in Peru, especially around Iquique, are among the most remarkable in the world. The Dutch islands of Curaçoa and Buen Ayre, N. of Venezuela, produce several hundred thousand barrels annually by natural evaporation and of the finest quality. Turk's Island, SE. of the Bahamas, was formerly the main source of sea salt for the U. S., and even now most of the salt from any of the W. India islands, or from Yucatan, is called Turk's Island salt. In Mexico the State of Oajaca has salines extending for thirty or forty leagues along the Pacific, which supply the whole interior of the state. British N. America, Nova Scotia, New Brunswick, Cape Breton Island, Newfoundland, and the Magdalen Islands contain salt springs. At Goderich on Lake Huron are productive salt wells.

The separation of salt from brines and sea water is conducted (1) by evaporation by the heat of the sun in shallow reservoirs; (2) by artificial heat, in shallow pans or in kettles, or by the "steam process"; (3) by exposing sea water to intense cold, when the ice formed is nearly pure, and a concentrated brine remains, which is afterwards subjected to one of the first two processes. The salt in common use in this country is obtained by artificial heat. In the kettle process, most frequently employed in this country, from fifty to sixty kettles, having a capacity of from 120 to 150 gallons each, are set in a row and heated. The clear brine is then drawn into the kettles, when evaporation goes on rapidly and at a higher temperature; consequently a larger proportion of the sulphate of lime separates before saturation than in the solar process. In the pan process the brine is evaporated, either slowly or rapidly as a coarse or a fine salt is desired. If a very fine grain is desired, the pans are stirred. In the steam process the brine freed from iron is drawn into steam settlers, where it is brought to saturation. These are wooden cisterns about 100 ft. long, 8 ft. wide, and 6 ft. high. They are heated by steam pipes. After the impurities have settled, the brine is drawn into grainers, which are only 12 to 15 in. deep; they are also heated by steam pipes. The salt forms rapidly. The character of the salt, especially its fineness, depends less on the character of the brine than on the care and rapidity with which the evaporation has been conducted.

In the U. S. salt was produced on a commercial scale, 1910, in fifteen states and two territories, *viz.*: California, Hawaii, Idaho, Kansas, Louisiana, Michigan, Nevada, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Porto Rico, Texas, Utah, Virginia, and W. Virginia, the aggregate of all grades being 30,305,656 barrels of 280 lb. each, valued at $7,900,344. New York led with $2,585,739, closely followed by Michigan, $2,231,262. The rank in production of the other important producers was: Ohio, Kansas, California, Texas, Utah, West Virginia.

SALT, in chemistry, is one of a large class of compounds. The older chemists regarded a salt as a product of the "union" of an acid with a base, as when (using the older notation, as well as atomic weights) nitric acid unites with potash to form nitrate of potash; and this definition is often used at the present time, but according to modern theory it is not strictly correct. To say that a salt is produced by the "action" of an acid on a base is correct as far as it goes, but salts are sometimes formed by the direct union of two elements, neither of which is an acid or a base. By the term base is meant a body composed of two or more elements (inorganic bases usually having only two), most frequently an oxide of a metal, which is capable of effecting a double decomposition with an acid, during which water and a salt are formed by the exchange of elements, as when oxide of silver is acted upon by nitric acid, where the oxygen of the oxide of silver unites with the hydrogen of the nitric acid to form water, while the metallic basyle silver unites with the radical to form nitrate of silver.

There are three varieties of salts which depend on the relative proportions of acid to base. They are called neutral or normal acid, and basic or subsalts. (1) *Neutral Salts.* A salt is commonly said to be neutral when the characteristics of both acid and base have neutralized each other; and this condition is usually regarded as existing when the salt has neither the effects of acids nor alkalies upon certain vegetable colors. But there are some salts which are regarded as neutral or normal, which have the power of changing vegetable blues to red, and *vice versa.* There are some acids (and they are all now regarded as salts of hydrogen) that contain only one atom of hydrogen which can be displaced by one atom of a monad metal. Such acids are said to be monobasic, and among them are hydrochloric, nitric, and acetic. When these acids unite with bases, they are capable of forming only monobasic salts. Other acids contain two atoms of hydrogen, which may be replaced by two atoms of a monad metal like potassium, or one equivalent of a dyad like zinc. These acids are called dibasic, and among them are sulphuric and tartaric. Other acids again contain three atoms of hydrogen, which may be replaced by three atoms of a monad metal or one atom of a triad; and such acids are said to be tribasic, of which tribasic phosphoric acid and citric acid are examples. Acids and salts which contain more than one equivalent of basyle are said to be polybasic.

In general, when all the atoms in the hydrogen basyle of the acid are, in the formation of the salt, replaced by an equivalent number of atoms of the metallic basyle, the salt as formed will be normal, or, in common language, neutral. (2) *Acid Salts.* When the atoms of the hydrogen basyle are only partially replaced by a metallic basyle, the salt so formed is an acid salt. (3) *Basic Salts.* These are such as contain a greater number of atoms of metallic basyle than there were atoms of hydrogen basyle in the acid. The tendency to the formation of basic salts is limited to certain acids and bases. The monad basyles do not form basic salts. (4) *Double Salts.* In considering polybasic acids and salts, it was seen that one of the atoms of

the hydrogen basyle of a dibasic acid might be replaced by an atom of a monad metallic basyle. Such an acid salt may be regarded as a true double salt of a metal and hydrogen. But a normal double salt may be formed by replacing one half of the hydrogen basyle with one monad metal, and the other half with another monad metal. Such are called double salts, of which Rochelle salt (tartrate of potash and soda) is an example. *Haloid salt* is a name given to salts like sodium chloride, or common salt; also called halides; are the chlorides, bromides, iodides, and fluorides, with which, further, the cyanides are frequently classed.

Saltillo (sāl-tēl'yō), capital of State of Coahuila, Mexico; in a valley, 5,204 ft. above the sea; near the boundary of Nuevo Leon; center of trade of the state; manufactures, cotton cloths. Pop. (1900) 23,996.

Salt Lake. See GREAT SALT LAKE.

Salt Lake Cit'y, capital of Utah and of Salt Lake Co.; in Salt Lake Valley, at the base of the Wasateh Mountains; 712 m. W. of Denver; altitude, 4,335 ft.; is laid out in blocks 660 ft. sq.; contains about 100 m. of streets, 132 ft. wide, bordered by streams of water brought from the mountains. Great Salt Lake is 11 m. distant. The city is the headquarters of the Mormon Church. The church buildings of this sect occupy ten acres, chief among them being the Great Temple (cost $5,000,000), forty years in construction; the Tabernacle (cost $500,000), an auditorium seating nearly 7,000 and containing one of the largest organs in the world; Assembly Hall, seats 2,500; Endowment House, the Lion, Beehive, and Guardo houses, former residences of Brigham Young and now used as church edifices, etc. Among notable buildings are the Salt Lake Theater, city and county building, two large private hospitals, Utah penitentiary. Educational institutions include Univ. of Utah (nonsectarian) and a state normal school; charitable, Holy Cross, Deseret, and St. Mark's hospitals. There is a large Gentile population, and all the leading religious denominations are well represented. The manufactures are varied and employ a capital of some $13,538,000. The city is headquarters for mining men, is the mining center of Utah and adjoining states, and is the largest smelting center in the world. It is the depot for agricultural products, and the distributing point for a large farming area under a perfect system of irrigation. The city was founded by Brigham Young, July 24, 1847. Until 1870 the population was almost entirely Mormon, but the development of mining and other industries induced a large immigration. Pop. (1910) 92,777.

Sal'ton Lake, or **Sea,** temporary lake, caused by an overflow of the Colorado River into a depressed area in the Colorado Desert. The bed of the lake is N. and a little W. from the head of the Gulf of California, and W. of the Colorado River in California, and probably was once occupied by the Gulf waters. The lake was formed in the early summer of 1891. The spot has large deposits of salt, which changed the fresh waters of the river into salt water in the lake. In 1905 a diversion of the river from its original channel occurred, recreating Salton Sea, which covered over 2,000 sq. m. and threatened to engulf a large farm area. In 1907 Congress appropriated $2,000,000 for improvements necessary to confine the river within its banks.

Sal'tonstall, Sir Richard, 1586–1658; American colonist; b. Halifax, England; nephew of Sir Richard, who became Lord Mayor of London, 1597; emigrated to Massachusetts as assistant governor to Winthrop, 1630; associated with Phillips in the foundation of Watertown, 1630; went back to England, 1631. Through his sons, who settled in Massachusetts, he was ancestor of the Saltonstalls of New England. RICHARD, 1610–94, b. Woodsome, York, England, was an early settler at Ipswich, Mass.; assistant governor, 1637; befriended the regicides Goffe and Whalley; protested against the introduction of negro slavery into the colony; returned to England, 1670.

Saltpe'ter, or Ni'ter, chemically, **potassium nitrate** (KNO_3), widely distributed, though in relatively small quantities. When refuse animal matter undergoes decomposition in the soil under proper conditions, the nitrogen contained in it passes into the form of a nitrate, and as potassium is generally present, the particular nitrate formed is saltpeter. The change is brought about by the action of certain microbes which exist in the soil, and are especially abundant and efficient in warm countries. In Bengal the saltpeter earth of the villages is collected by a special caste, the Sorawallahs, into loosely aggregated heaps. From these the salt is obtained by scraping off the uppermost layers, which show a wide efflorescence. The process of nitrifaction is as follows: Refuse animal matter, more especially manure, is mixed with earthy material, wood ashes, etc., and piled up. These piles are moistened with the liquid products from stables. After the action has continued for two or three years the outer crust is taken off and extracted with water. The solution is treated with a water extract of wood ashes or with potassium carbonate, by which the calcium and magnesium are precipitated. Much of the saltpeter in the market is made from sodium nitrate by treating it with potassium chloride. When dissolved in water it causes a lowering of temperature. It is used in the manufacture of fireworks; chief use, however, is in the manufacture of gunpowder.

Saltpeter, Chil'e, sodium nitrate ($NaNO_3$); also called cubic niter, because it crystallizes in rhombohedrons resembling a cube; occurs abundantly in N. Chile, and to some extent in S. Peru. Sodium nitrate is used extensively in the manufacture of nitric acid and of potassium nitrate; it is also the most important source of iodine. In commerce the salt is known simply as nitrate. It is largely exported from Chile to Europe for use as manure.

Salt Range, or Kalabagh (kă-lă-bäg'), **Moun'tains,** mountain group of the Punjab, India; extends W. from the W. bank of the Jhilam to the Suleiman Mountains with a break in its continuity where it yields a passage to the Indus; 2,500 ft. high; its bold peaks and steep, wild precipices, consisting of granite, gypsum, and layers of almost perfectly pure rock salt, present a forbidding aspect.

Salt Rheum. See ECZEMA.

Salt Riv'er, a Kentucky affluent of the Ohio. Defeated politicians are said to be "sent up Salt River," from an incident in the life of Henry Clay, who, 1832, heard the news of his defeat for the presidency as he landed from a passage up this stream.

Salt Sea. See DEAD SEA.

Saluta'tion, words or signs of greeting. Among the ancient Greeks the verbal form was *Χαῖρε* ("Rejoice"); among the ancient Romans, *Salve, vale* ("Be healthy, be strong"), and *Quid agis?* ("What doest thou?"). The French say: *Comment vous portez vous?* ("How do you carry yourself?"); the Germans: *Wie befinden Sie sich?* ("How do you find yourself?"); the Italians: *Come sta ella?* ("How do you stand?"); the modern Greeks: *Τί κάμνετε?* ("What do you do?"); the Dutch: *Hoe vaart gij?* ("How do you fare?"); the Swedes: *Huru mår Ni?* ("How can you?"). One form of salutation in Egypt is: "How goes the perspiration? do you sweat copiously?" In China a common salutation is: "Have you eaten your rice? is your stomach in good order?" and in Holland, *Smakelijk eten?* ("Have you relished your meal?"). One Polish form is: *Czys wesół?* ("Art thou gay?"); and another: *Jak sie masz?* ("How hast thou thyself?"). Two common salutations in Russia are: *Zdrastvui* ("Be well"), and *Kak pozhivayete?* ("How do you live on?"). The Turks say: "Be under the care of God," "My prayers are for thee," and "Forget me not in thy prayers." An old English salutation in polite society was: "Save you, sir," evidently an abbreviation of "God save you, sir," just as "Good-by" is a contraction of "God be with you." Shaking hands is the most common method of salutation among civilized nations, though probably it comes from the remotest barbarism, when two men meeting gave each other their weapon hands as a security against treachery or sudden attack. Kissing is common on the continent of Europe between men who are intimate friends, but in England and the U. S. is practiced only by women. In the E. and among the Slavic nations the salutations partake of the character of self-abasement.

Salutes', in the army and navy, honors paid to officers of higher rank or authority by raising or touching the hat, dropping the point of the sword, presenting arms, firing cannon or small arms, manning yards, dipping the colors, etc. In the personal salute with cannon the number of guns fired depends on the rank of the person saluted. In the U. S. the President receives 21 guns, the Vice President 19, the members of the Cabinet, the chief justice, the Speaker of the House of Representatives, and governors within their own state or territory, 17. A general receives 17, lieutenant general or major general commanding 15, major general 13, and brigadier general 11. Besides these personal salutes there are the National salute of 21 guns, the salute to the Union of one gun for each state, and the old Federal salute of 13 guns. These are fired in honor of certain days and occasions. In the personal salutes is seen the survival of the custom of the saluter placing himself unarmed in the power of the saluted. The touching or removal of the cap, dropping the point of the sword, presenting arms, firing cannon and small arms, manning yards, etc., symbolize the removal of the helmet, giving up the weapon, unloading the firearms, exposing the crews, abandoning the guns, etc.

Salvador (Spanish, säl-vä-thōr'), often, but incorrectly, called SAN SALVADOR, republic of Central America; bounded NW. by Guatemala, N. and NE. by Honduras, and S. by the Pacific, the Gulf of Fonseca separating it from Nicaragua on the E.; area, 7,255 sq. m.; pop. (1906) 1,116,253; chief towns, San Salvador (capital), Santa Aña, San Miguel, Nueva San Salvador, San Vicente, Sonsonate. The main Cordillera of Central America runs along the N. frontier. Parallel to this, and about 30 m. farther S., another mountain chain, attaining nearly 8,000 ft., crosses from E. to W., and is continued into Nicaragua; this chain contains nearly thirty active or quiescent craters. The space between the two mountain ranges is an irregular basin or plateau, 2,000 ft. in average elevation, and varied by low mountains. S. of the volcanic range a strip of low land, partly alluvial, fringes the Pacific. The coast is about 200 m. long, partly rocky. The only very good harbor is formed by the Gulf of Fonseca; the commercial ports are La Union on the gulf, La Libertad, and Acajutla. The principal river is the Lempa, which drains the plateau and is partly navigable. Volcanic and seismic disturbances are very frequent; slight earthquakes are common, and severe ones occur at intervals. The climate is hot and often unhealthful on the coast, warm on the plateau, temperate in regions above 3,000 ft., where most of the towns are located. Rains are less abundant than in other parts of Central America, though the climate is by no means dry. The most important crops are coffee, indigo, tobacco, sugar, and, for home consumption, maize, beans, and rice. Large herds of cattle are pastured in some districts. Gold and silver are mined on a small scale. About five per cent of the population are classed as whites, fifty-five per cent as Indians, and the remainder as mixed races, with a few negroes. The government is a centralized republic; the president is elected for four years, and Congress consists of a single house, elected for one year. The state religion is the Roman Catholic; other creeds are tolerated. There are about 900 public and private schools, with 35,000 pupils; the state maintains a university with faculties of sciences, arts, law, medi-

cine, etc. There is a fairly good telegraph system, and cable communication with the U. S. The principal exports are coffee (about half of the total), indigo, tobacco, balsam, sugar, gold and silver ores and ingots. Nearly one third of the entire trade is with the U. S., principally California. Salvador or Cuscutlan was conquered by Jorge de Alvarado, 1528, and during the colonial period was a province of Gautemala. From 1823 to 1839 it was a state of the Central American Confederation.

Sal'vage, in admiralty, compensation earned by persons who assist in saving a ship or her cargo from peril. There is no fixed rule as to the amount of salvage; it depends on the danger to property, risk of life, and the value, skill, labor, and duration of the service. Salvage cannot be decreed for merely saving life, but the court will take notice of the saving of life when it is connected with the saving of property. Salvage services can be performed only by persons not bound by their legal duty to render them. Thus a crew cannot claim as salvors of their own ship or cargo, though it is said they may have valid claim for compensation where their contract is at an end, or the service is so extraordinary that it is held not to be rendered under their contract. The service may be rendered by seamen or landsmen, either at sea or where the vessel is wrecked. Salvage is generally decreed on all the property saved, whether ship, cargo, or freight. A service which would ordinarily sustain a claim for salvage may not always do so; as where it is rendered under a custom to give assistance gratuitously in similar instances.

Salvarsan, an arsenical preparation, specific for syphilis; announced by Ehrlich, Frankfort, Germany, in 1910, under the title of "606." The remedy is given by injections and is reported to have no ill effects on the patient.

Salva'tion Ar'my, religious body with a military organization; had its beginning in the work of William Booth, later its "general," as an evangelist among the poor of E. London. In 1865, having severed his connection with the Methodist body in order to give his whole time to revival work, he began by holding open-air meetings; soon the E. London Mission was established. In 1869 its name was changed to the Christian Mission, and various branches were formed. In 1880, with its opening in France, it began its international career.

In 1878 the name was changed to the Salvation Army, and a military system adopted, and the general of the army was made the trustee of its funds and property in Great Britain. The theology is of the simplest. The work in hand is "to subdue a rebellious world to God." This is to be accomplished by the instrumentality of consecrated men and women using the means used by the first apostles, made effective by the cooperation of the Holy Ghost. On these lines the ranks are recruited from converts made from every strata of humanity, from the top to the bottom.

In 1890 Gen. Booth published "In Darkest England, and the Way Out," in which he dealt with the problem of destitution and crime from the standpoint of the Salvation Army. In accordance with his plans, a farm colony, city colonies, and an over-the-sea colony were established, and in different parts of the world several hundred shelters, industrial and rescue homes, labor factories, workingmen's hotels, labor bureaus, etc., have been opened for the homeless and the outcast.

On March 10, 1880, Commissioner George Scott Railton, in company with seven earnest young women, landed at Castle Garden, New York City. After a time the work was very propsperous, extending across the border into Canada, and has gone on steadily increasing ever since.

The operations are carried on in 63 countries and colonies, under 17,374 officers and cadets, with many thousands of unpaid local officers and 28,747 bandsmen. Eighty periodicals are published in many languages and dialects, and circulate to the extent of over 1,000,000 copies weekly. International headquarters are in London. The official organ is *The War Cry*, and there is a monthly magazine, *The Social News*, also two additional weeklies, *The Young Soldier* (for the children) and *Stridropet* (for the Scandinavian branch).

At the outbreak of the World War, the Salvation Army lost no time in sending its workers to the front. When the U. S. entered the great struggle, Commander Evangeline Booth at once mobilized her forces and, after asking and receiving the cordial endorsement of President Wilson, sent several groups of men and women workers with the American Expeditionary Forces. These workers were frequently under shell fire, and many of them were gassed. Their ministrations to the American soldiers found expression in such homelike acts as the baking of apple pies, frying of doughnuts, supplying of oranges and lemonades, chocolate bars, etc., and the repairing of the soldiers' garments. Many religious meetings were also held. Commendation of this service was universal, from General Pershing down to the enlisted men. Several Salvation Army workers were decorated and cited for notable service. Commander Evangeline Booth received the Distinguished Service Medal. The financial "drives" of the Salvation Army, both for war work and for home service, were very successful The last "drive" (1919) was for $13,000,000 and was devoted to home service.

Salva'tor Ro'sa. See ROSA, SALVATORE.

Salvini (sal-ve'ne), **Tommaso,** 1830–1916; Italian tragedian; b. Milan; son of actors; about 1847 joined the Ristori troupe, and achieved success; active in war of Italian Independence, 1849, and taken prisoner at Genoa. Retiring to Florence, he devoted a year to study, preparing among others the roles of *Othello*, *Saul*, *Hamlet*, and *Orosmane*. His theatrical tours in Italy, Spain, England, Germany, and other European countries were a series of ovations. In 1872 he visited S. America, and, 1873–74, 1881–83, and 1885–86, made tours of the U. S. He retired soon after.

Salz'mann, Christian Gotthilf, 1774-1811; German educator; b. Rohrborn, near Erfurt, Saxony; entered the ministry, and remained

in it for several years; at the same time entered into relations with Basedow, and, 1781, went to Dessau to take charge of the religious instruction in the institute. In 1784 he opened an educational institution in Schnepfenthal, which became one of the famous schools of Europe.

Samana' Bay, a deep indentation in the E. end of Santo Domingo, W. Indies; 37 m. long and 12 wide; forms a large and fine harbor. The principal ports are Sabana la Mar on the S. side and Santa Barbara de Samana on the N. Although it lies near the route from New York City to the Isthmus of Panama, the U. S. Congress refused to ratify a treaty for its purchase, 1870.

Samar', third island in size in the Philippine Archipelago; separated from Luzon on the NW. by San Bernardino Strait, from Leyte on the SW. by the Strait of San Juanico; length, 156 m.; breadth, 75; area of mainland, 5,198 sq. m.; with 148 dependent islands, 5,488; pop. (1903) 222,690, chiefly Visayans and Tagalogs. The surface is mountainous, in the main, but principal chain scarcely exceeds 1,750 ft.; rivers numerous, chief one being the Oros, 36 m. long; a number of good harbors; coal, gold, copper, and cinnabar are found; sugar, rice, coffee, tobacco, wheat, hemp, corn, cacao, and cocoanuts raised in abundance; raising of live stock an extensive industry; chief manufactures, sugar and cocoanut oil. Capital, Catbalogan, on W. coast.

Samarang', town of Java, E. Indies; capital of the Dutch residency of Samarang; on the N. coast of the island, at the mouth of the river Samarang; has an important trade, though its climate is unhealthful and its harbor shallow; is the entrepôt for the products of the central part of the island. Pop. (1905) 96,600.

Sama'ria, ancient city of middle Palestine, in Ephraim; founded abt. 925 B.C. by Omri, who made it the capital of the kingdom of Israel. In 721 it was conquered by the Assyrians; 109 it was razed to the ground by John Hyrcanus, but was soon rebuilt; Augustus gave it to Herod the Great, who fortified it and called it Sebaste. A little village, Sebustieh, with some ruins, now exists on its site. Under the Romans a main division of Palestine between Judea and Galilee was called Samaria.

Samar'itans, people commonly supposed to have sprung, after the conquest of Samaria by Shalmaneser, from the mixture of the natives with foreign colonists from Babylon, Cuthah, Ava, Hamath, and Sepharvaim. As they were a mixed race, their religion was also mixed. After the return of the Jews from the Babylonish captivity the Samaritans asked permission to participate in the restoration of the Temple, but it was refused; and from this event (535 B.C.) dates the hostility between Jews and Samaritans. It increased in the latter part of the fifth century B.C., when the Persian governor Sanballat erected for the Samaritans on Mt. Gerizim, near Shechem, a temple of Jehovah, and gave them an independent high priesthood. Alexander the Great took a Samaritan army with him to Egypt, and many settled in the Thebaid. In Palestine, where the Samaritans were crushed by John Hyrcanus, 109 B.C., a few families are found at Nablus, the ancient Shechem. The Samaritans recognize only the Pentateuch, rejecting the rest of the Hebrew canon. The Samaritan language is an Aramean dialect, mixed with many Hebrew forms and words.

Samarkand' (ancient, *Maracanda*), city of Asia, belonging to Russia; formerly in the khanate and 135 m. E. of the city of Bokhara; in the valley of the Zerafshan; 4 m. S. of that river; in site and surroundings is said to be the most beautiful city in Turkestan; but much of its interior aspect is miserable. The principal buildings are the summer palace of Tamerlane, his mosque, his reception hall containing the celebrated *köktash*, or blue stone, on which his throne was placed, and his sepulcher without the city. Considerable trade is carried on, especially in the products of leather manufacture. As the capital of Tamerlane, Samarkand was the most famous, luxurious, and magnificent city of central Asia. The Russians acquired it, 1868, in their war with Bokhara. Pop. (1900) 58,194.

Samar'ra, town in Asiatic Turkey, vilayet of Mesopotamia; on the Tigris; 62 m. NW. from Bagdad; founded by the Caliph Motassem (836) with frightful extravagance. The stables of the caliph could contain 100,000 horses. The city is revered by the Shiite Musulmans, and annually attract great numbers of pilgrims. Pop. abt. 2,500.

Samba'tion, river said by Oriental folklore to flow during the week, but to rest on the Sabbath; first mentioned by Pliny. Josephus reverses the order, and says it flows only on the Sabbath. The belief had its origin in the many intermittent springs in Palestine, and in the wish to make nature witness to the holiness of the Sabbath. There existed belief in a river which flowed sand and stones, which, because of its name (Sand or Week River), was confounded with the Sambation. Similar traditions exist in the E.

Sambre (sän'br), river of France which rises in department of Aisne, and joins the Meuse at Namur, Belgium, after a course of about 100 m.; navigable for a great part of its course; forms an important part of the system of canals in N. France and Belgium.

Sam'isen (literally, "the three pleasing threads"), most popular of Japanese musical instruments; consists of a neck or finger board, and a square drum, rounded off at the corners and covered with parchment. There are three strings of silk, which the player strikes with a broad pecten. The drum receives the first blow from the pecten, and thus two vibrations are set up. In the fingering the nails are made to press the strings. The instrument is said to have been introduced from Loochoo about 1560.

Sam'nium, division of ancient Italy, comprising most of the present provinces of Campobasso and Benevento, with some surrounding

districts. The principal places were Beneventum (Benevento), Caudium (Airola), near which were the passes famous for a Roman defeat, Aufidena (Alfidena), Bovianum (Bojano), and Æsernia (Isernia). The Samnites were a warlike people of the Sabine race, who conquered the country from the Opicans before the foundation of Rome. With this republic they waged a series of wars (343–290 B.C.), in which Valerius Corvus, Curius Dentatus, Papirius Cursor, Fabius Maximus Rullianus, and other Romans shine as heroes amid frequent disasters. They were finally subdued, joined Pyrrhus, 280, but succumbed again, and, 216, took sides with Hannibal, but without any permanent result. During the war of Sulla and Marius they tried to recover their independence; but their army was annihilated by Sulla in a battle at the Colline gate of Rome, and their country laid waste and distributed to Roman settlers, the inhabitants being sold into slavery (82).

Samo'a, group of fourteen volcanic islands of Polynesia, NE. of the Fiji Islands; consists of three larger islands—Savaii (area, 659 sq. m.), Upolu (340 sq. m.), and Tutuila (54 sq. m.)—and the smaller Manua group to the E.; total area, 1,701 sq. m.; pop. 36,800. Upolu is the most populous, and on its N. shore is Apia, the principal port and capital of the group. Pago Pago, in Tutuila, is the only good harbor. The volcanoes are quiescent; climate tropical, soil fertile, vegetation luxuriant. The natives are of pure Polynesian race, fairly intelligent, devoted to agriculture and fishing; are all nominal Christians, about two thirds being Protestant, the remainder Roman Catholic. Chief products: copra, cacao, cotton, and coffee. The archipelago was discovered, 1722, by Roggeveen. Bougainville visited the islands 1768, and named them Navigator Islands. They are in direct steam communication with New Zealand, Australia, and California. Formerly the islands, with the exception of Tutuila, which had independent chiefs, were governed by the royal houses of Malietoa and Tupua. In 1881, by an agreement between Germany, Great Britain, and the U. S., Laupepa became king of all Samoa, and Tamasese vice king. These two chiefs frequently changed places till, 1887, the Germans proclaimed Tamasese king and Laupepa was deported. Mataafa, the chief of the loyalist party, made war against Tamasese. The Germans proclaimed martial law. A truce was finally arranged, and at a conference in Berlin between representatives of Germany, Great Britain, and the U. S., Samoa was declared (1889) independent and neutral. Laupepa was reëlected king by the people. By treaty, signed April 19, 1890, Apia was converted into a municipal district or international port, and placed under a municipal magistrate; by Anglo-German agreement of 1899, Great Britain and Germany renounced in favor of the U. S. all rights over Tutuila and the other islands E. of 171° lon., the islands W. of that meridian being assigned to Germany. See APIA.

Sa'mos (called by the Turks SUSAM-ADASSI), island of the Grecian archipelago, belonging to Turkey, separated from the coast of Asia Minor by Little Boghaz (strait), and from the island of Nicaria (ancient, *Icaria*) by the Great Boghaz; area, 289 sq. m.; pop. 53,400, nearly all Greeks. The chief town is Chora. There are several good harbors. The olive and vine are cultivated, and grain, silk, cotton, wine, figs, and oil are exported. The minerals include marble, iron, lead, silver, and emery, but are not worked. In the sixth century B.C. the navy of the Samians was the most powerful in the Grecian waters, and their capital, Samos, near the site of the present town of Chora, was one of the finest cities in the Hellenic world. After the death of its famous tyrant Polycrates, the island belonged to Persia 522–479 B.C., and it was afterwards a member of the Athenian League. Since 1835 it has been governed by the Greek family Vogorides. The governor, styled "Prince of Samos," pays an annual tribute of about $18,000 to the sultan.

Samothrace' (modern Greek, SAMATHRAKI; Turkish, SEMENDREK), island of the Grecian archipelago, belonging to Turkey, between Lemnos and the coast of Thrace; area, about 32 sq. m.; is high, sterile, and destitute of ports. In antiquity it was called Dardania, Electris, Melite, and Leucosia, and was a chief seat of the worship of the Cabiri.

Samoyeds', nomadic people in the N. parts of European and Asiatic Russia, forming a branch of the Uralo-Altaic division of mankind. They were originally spread from the Altai Mountains to the Arctic, and from the White Sea nearly to the Lena River. Their principal seat is now the space between the Obi and the Yenisei. Their whole number is estimated at less than 20,000, divided into three principal and several smaller tribes speaking different dialects. They are mostly idolaters, dwelling in tents, short and repulsive-looking, but peaceable.

Sam'phire, succulent plant of the parsley family, *Crithmum maritimum*, a smooth perennial, about a foot high, found on rocky cliffs by the sea shores of Britain and S. to N. Africa. The leaves and young shoots have a pleasant aromatic taste, and the plant was held in great esteem as a stomachic, and used in salads and pickled. The plant sometimes called samphire in the U. S., and marsh samphire in England, is *Salicornia herbacea*, more generally known as glasswort. It is very abundant along the coast and in salt marshes in the interior; it is much relished by cattle, and in Europe was formerly burned in large quantities for the soda contained in its ashes.

Samp'son, Samson, Deborah, 1760–1827; American heroine; b. Plympton, Mass.; disguised her sex and under the name of ROBERT SHURTLEFF enlisted in the Fourth Massachusetts Regiment, 1778; showed great bravery in action and was twice wounded. During the Yorktown campaign she was seized with brain fever and was sent to a hospital in Philadelphia, where her sex was discovered. She was honorably discharged, received a purse of money from Washington, and during his ad-

ministration was voted a pension by Congress. After the war she married Benjamin Gannett, a farmer of Sharon, Mass. She published "The Female Review," a narrative of her army life.

Sampson, William Thomas, 1840–1902; American naval officer; b. Palmyra, N. Y.; graduated at Annapolis, 1860; while executive officer of the ironclad *Patapsco*, of the S. Atlantic blockading squadron, 1865, was ordered to destroy the submarine mines and torpedoes in Charleston harbor, and lost the *Patapsco* in the attempt. He was attached to the *Colorado*, flagship of the European squadron, 1865–67; at Naval Academy till 1871; ordered to special duty on the *Congress*, 1872; commanded the *Alert*, 1874–75; returned to Naval Academy for two years; and commanded the *Swatara*, of the Asiatic station, 1879–82. After serving at the Naval Observatory for three years, he was put in charge of defenses, 1885; superintendent of Naval Academy, 1886–90; promoted captain, 1889; put in command of the *San Francisco*; chief of Bureau of Ordnance, 1893–97, when he was ordered to command the *Iowa*. He was president of the board of inquiry regarding the destruction of the *Maine* in the harbor of Havana, February 15, 1898. At the outbreak of war with Spain he was made acting rear admiral in command of the N. Atlantic squadron sent to blockade the Cuban ports. At the beginning of the engagement with the Spanish fleet off Santiago he was at Siboney for conference with Gen. Shafter, leaving Commodore Schley in command of the American vessels, but returned shortly before the close of the fight. Promoted rear admiral, 1898; made commandant of Boston navy yard, 1899; relieved for ill health, 1901; retired, 1902.

Sam'son (Hebrew, SHIMSHON), Hebrew judge, "in the days of the Philistines, twenty years," as related in the Book of Judges; son of Manoah, of the tribe of Dan; was a Nazarite by birth; early began to exhibit superhuman strength; probably (as he "judged Israel") was chief magistrate of the nation. The great achievements recorded of him are connected with his love for his Philistine wife and for two women of loose character, one of whom, Delilah of Sorek, effected his ruin by cutting off his hair, which had never been shorn, and in which she had learned that the secret of his strength lay.

Sam'uel (Hebrew SHEMUEL), Hebrew judge, lawgiver, and prophet; b. probably in twelfth century B.C., and at Ramathaim Zophim or Ramoh in Mount Ephraim; son of Elkanah and Hannah, of the tribe of Eli; consecrated by his mother to the service of Jehovah as a Nazarite; assumed the judgeship of Israel abt. twenty years after the death of Eli, the high priest, and headed a successful expedition against the Philistines. In his old age he appointed two of his sons deputy judges at Beersheba. The people became dissatisfied, and demanded a king. Samuel, with great reluctance, yielded by divine direction, and anointed Saul the first king of Israel, but continued to be judge until his own death. He rebuked Saul on several occasions, and at length, in the name of the Lord, anointed David as second king before the demise of Saul. Under him Israel became independent of the Philistines, and his administration was in all respects brilliantly successful. He gave organized form and increased power to the prophetic activity of Israel. His history is recorded in the first of the two biblical books of Samuel.

Samuel, The Books of, called in the LXX and Vulgate the first and second books of Kings. The books of Judges and Samuel, either with or without Ruth, are a connected whole, evidently formed, to a large extent, by the process of combining earlier writings. The Talmud attributes the series to the prophet Samuel, with supplementary work by the prophets Nathan and Gad. This is probably correct in the sense that the work was initiated by Samuel and dominated throughout by his spirit.

Scholars hold various opinions as to the time when the books of Samuel were composed in their present form, but really there is no reason for dating them later than the lifetime of Nathan, that is, some time in the reign of Solomon. All the many alleged reasons for assigning to them a later date fade out when closely examined. In any case, the books of Samuel are not continuous, as a literary work, with the books of Kings, though the latter take up the history at the point where the former leave it. Many particulars might be cited to show that the authors of the two series were men very dissimilar in their point of view and their literary habits. In their contents the books of Samuel are a history of David and his reign, with a preliminary account of the calamities that preceded Samuel, the brilliant administration of Samuel himself, the establishing of the kingdom, the reign of Saul, and especially Saul's relations to David.

Samurai (sä-mō-rī'), literally "guard," name given to Japanese warriors under the feudal régime. Before the Tokugawa shogunate the name included even the shogun and daimios. The samurai were a class apart, numbering, 1870, about 400,000 families, intermarrying among themselves, and having a peculiar code of honor, etiquette, and morality. The privilege of wearing two swords, withdrawn 1876, gave them the name of "two-sworded men." The modern police and gendarmerie and the officers of the army and navy are of samurai stock.

Sanaa (sä-nä'), capital of vilayet of Yemen, Arabia; 7,120 ft. above the sea; surrounded by arid mountains. A thriving trade is carried on in coffee, indigo, gum, arabic, aloes, and skins. Mohair and camel's-hair carpets are made. Sanaa was important before the time of Mohammed, its temple rivaling the Kaaba. Since 1872 it has formed part of the Ottoman Empire. Pop. abt. 60,000.

San Anto'nio, capital of Bexar Co., Texas; on the San Antonio and San Pedro rivers; largest city in the state; on a level and fertile

plain; has an abundant supply of water for manufacturing and domestic purposes from the rivers, the old Spanish acequias, and several artesian wells, and is the site of a U. S. military post, permanently established 1875. It has an excellent climate, with a remarkably even temperature and a dry air. There are several large public parks and plazas, a U. S. Govt. building, new county courthouse, large opera house, several hospitals, and a number of fine halls belonging to secret societies and social clubs. The most imposing church building is the Roman Catholic Cathedral of San Fernando, incorporating parts of an earlier church edifice, where Santa Anna had his headquarters, 1836. There are two academies for boys, St. Mary's College, St. Mary's Hall, Wolfe Memorial School, Ursuline convent and school, a young ladies' school, young ladies' seminary, and two business colleges. Manufactures of railway cars, malt liquors, saddles and harness, foundry products, flour, candy, brick, etc., employ a capital of some $8,629,000. The city also has large interests in stock raising, and the shipment of cotton, wool, and hides.

The city was founded 1714. Among the points of special interest are the mission of San Antonio de Valero, better known as the Alamo, founded 1720, for many years used as a fort, and the scene of Santa Anna's massacre of Texan patriots, 1836; the First or Mission Concepcion, founded 1716, and the scene of a battle between Mexican and Texan troops, 1835; the Second or Mission San José de Aguayo, founded 1720; and the Third or Mission San Juan Capistrano, founded 1716, and the rendezvous of the Texans prior to their capture of San Antonio, 1835. Est. pop. (1910) 96,614.

San Antonio Riv'er, stream that rises in Bexar Co., Texas, flows SE. 200 m., and falls into the Gulf of Mexico at Espiritu Santo Bay.

Sanball'at (from Assyrian SIN-UBALLIT, "the god Sin gives life"), in Book of Nehemiah, the head of the opposition which Nehemiah encountered in rebuilding the walls of Jerusalem. He is called a Horonite, and his daughter is said to have married the son of a high priest. Josephus mentions an officer in Samaria bearing the same name, but places this Sanballat at the time of Alexander the Great, and has evidently confused the biblical person with some other.

San Bernardi'no, capital of San Bernardino Co., Cal.; 60 m. E. of Los Angeles; in farming, fruit-growing, and mining region; center of the great San Bernardino basin and of the citrus belt; has mountains on three sides, and commands a fine view of Mount San Bernardino, the loftiest peak of the Coast Range. The city is laid out attractively, with broad streets, and has an abundant supply of artesian water; climate mild and equable. Among public buildings are a courthouse, Hall of Records, public high school, and St. Catharine's Academy. The city has important steam communications, and contains large shops of the Southern California Railway. Pop. (1910) 12,779.

San Blas, Gulf or Bay of, bay on N. side of Isthmus of Panama, here its narrowest part, forming the subisthmus of San Blas; 31 m. wide, and navigable estuary of the Banyano River, reduces the distance to 18 m. The proposed "San Blas route" for a ship canal was across this neck, but surveys showed that the high mountains render it impracticable.

San Car'los (Venezuela). See BARINAS.

Sanchoni'athon (Phœnician, SAKKUN-YATHON, "Sakkun has given"), name of a mythological Phœnician said to have lived before the Trojan War, and to have written a history of the Phœnicians. Philo translated this book into Greek; fragments of it have been preserved by Eusebius and the Neoplatonic philosopher, Porphyry. Modern scholars, while denying the existence of a Phœnician writer by the name of Sanchoniathon, believe that Philo embodied in his work traditions which were current in his native city, though the whole has more or less of a pseudepigraphic character. The fragments extant seem to show that Philo culled from various sources.

Sancroft (sǎng'krŏft), **William**, 1616–93; English prelate; b. Fressingfield, Suffolk; became chaplain to Bishop Cosin of Durham, 1660, in which year he assisted, privately, in the revision of the Prayer Book; became prebendary in Durham Cathedral; master of Emmanuel College, Cambridge; Dean of York, 1663, and of St. Paul's, London, 1664; was presented by Charles II to archdeaconry of Canterbury, 1668; to archbishopric of Canterbury, 1677. He attended Charles II on his deathbed, and wrote the petition presented to James II, 1687, against the Declaration of Indulgence, signed by himself and six other prelates, for which they were committed to the Tower; tried for misdemeanor before the King's Bench, and acquitted, 1688. Refusing to take the oath of allegiance to William and Mary, he was deprived of his see, 1691.

Sanc'tuary. See ASYLUM.

Sand, George (pen name of AMANTINE LUCILE AUBORE DUPIN, MADAME DUDEVANT), 1804–76; French novelist and playwright; b. Paris; married, 1822, Baron Dudevant, of the army, and separated from him, 1831; divorced, 1836; removed to Paris; in connection with Jules Sandeau wrote "Rose et Blanche," published under the pen name, JULES SAND, and alone, "Indiana," a novel under the pen name, GEORGE SAND, which she afterwards retained. In 1832 "Valentine" made her name celebrated, and, 1833, her celebrity rose to sensation with "Lélia." A journey to Italy in company with Alfred de Musset resulted in such works as "Lettres d'un Voyageur," and to a quarrel with him was due his "Confessions d'un Enfant du Siècle," 1836, in answer to which she published, but not till 1859, "Elle et Lui." To an intimate friendship with Chopin, 1836–47, the many beautiful passages on music in her later books are attributable. During the period 1835–49 she produced minor novels, "Le Sécrétaire Intime," "Pauline," etc.; promulgated very advanced social, political, and religious views in "Lettres à Marcie,"

"Spiridion," "Horace," "Consuelo" (her best-known work), and others; and published some of her most beautiful writings, including "La Petité Fadelte" and "La Mare au Diable." During the Revolution of 1848 she wrote proclamations and founded newspapers. Subsequently, for a long period, she wrote chiefly for the theaters, and "François le Champi," "Claudie," and some others were very successful. She contributed to *Le Monde*, the *Revue des Deux Mondes*, and other periodicals, and abt. 1842 aided in founding the *Revue Indépendante*. In 1854 she published "Histoire de ma Vie." Her latest books included the powerful, descriptive, and reflective novels, "Mlle. la Quintinie," "La Confession d'une Jeune Fille," and "Cadio." Her collected works comprise 107 volumes.

Sand, granular fragments with texture coarser than clay and finer than gravel. Sand grains may be angular or rounded; in other respects a gravel is merely a coarser sand, and a sand a finer gravel. Sands are derived primarily from the disintegration of crystalline rocks; secondarily from the disintegration of sandstones which were themselves formed by the consolidation of preëxistent sands. Sand grains whose material is hard and resists decomposition are practically indestructible. Streams, shore waves, and winds—the principal agents for the transportation of sand—accomplish also its separation from gravel and clay. The best-rounded sands are those found on deserts, where they are shifted to and fro by the winds. The most abundant material in sand is quartz, and next to it stands feldspar. Hornblende, magnetite, and garnet are of frequent occurrence, and sands freshly derived from crystalline rocks contain all the constituents of the parent rocks. Of the many industrial uses of sand, probably the most important are for the manufacture of mortar and artificial stone. For these purposes angular grains are preferable. See SANDSTONE.

San'dalwood, aromatic wood of several species of *Santalum*, especially *S. album*, of the E. Indies. Some is also furnished by species in the Hawaiian and Fiji Islands and Australia. The Indian sandalwood is a tree 20 to 30 ft. high, with a trunk 6 to 12 in. through. The wood is heavy, its density and aroma being greatest when it grows on dry and poor soil; the color is a pale brown, varying in different samples; it splits easily; it has a persistent odor which is agreeable to most persons; its taste is strongly aromatic. The aroma of the wood depends upon a volatile oil, which is light yellow and thick, and begins to boil at 385° F.; a resin is also found in the wood.

Red sandalwood, or Saunders wood, is furnished by *Pterocarpus santalinus*, a leguminous tree, native of various localities in S. India, 20 to 30 ft. high, and seldom over 4 ft. in girth. It was formerly supposed to be medicinal, but is now used only for coloring; the compound spirit of lavender, popularly called red lavender, owes its color to this.

San'dalworts, the *Santalaceæ*, a small family of apetalous dicotyledonous plants widely distributed over the world, and including the sandalwoods. It is most nearly related to *Loranthaceæ*, but incompletely, if at all, parasitic. The European species are all herbs, as are the members of *Comandra*, the commonest N. American representative; but the Alleghanies have two shrubby genera; one of these, *Pyrularia*, oil nut, has a large kernel abounding with acrid oil. The quandang nut of Australia, however, is bland and edible.

San'darach, gum resin from a small coniferous tree, *Thuja articulata*, which grows in Barbary; occurs in pale-yellow oblong grains or tears, covered with a fine dust, is transparent and brittle, with a vitreous luster on the fracture. It is used as an incense and in varnishes. Its powder is rubbed on writing paper where erasures have been made, to prevent the spreading of ink.

Sand Blast, stream of sand propelled by the pressure of air or steam and used for cutting and engraving glass, stone, etc. The process was invented by Benjamin C. Tilghman, and was suggested by the effect of wind-blown sand in destroying the transparency of glass. In practice, two kinds of work are performed by the sand blast, called, respectively, heavy and light work. For the former a high pressure and a correspondingly great velocity are required; for the latter the pressure is light and the velocity low. Ordinarily, for light work, the necessary velocity is given to the sand by means of an air blast produced either by a rotary fan or positive blower, or by the pressure of the atmosphere acting toward a vacuum maintained by a fan or a steam jet. For simply depolishing glass or making ground glass, the current of air is conducted into a rectangular trough of any desired length, narrowed at the bottom to an opening an inch wide, and having its top perforated by small tubes for the admission of the sand. The glass is carried slowly across the opening of this jet, and about an inch below it, by means of a traveling apron. By this process glass is obscured with great rapidity, almost as soon as it is held in position. In order to engrave a design on the glass, the parts which are to remain bright have to be protected with a composition or by blotting paper, soaked in glycerin and glue, from which the desired pattern has been cut out. For heavy work either air or steam may be used; but steam is more readily employed, and is preferred, as it cuts twice as fast as air under the same pressure. The steam is used in a jet, technically called the blast pipe or gun. For purposes of ornamentation in stone the sand-blast process has no rival. The method employed is simply to protect those portions of the stone which are not to be cut away with a suitable mat or template of rubber or other elastic material. The sand blast is also used for cleaning stone buildings, etc.

Sandeau (sän-dō'), **Léonard Sylvain Jules,** 1811–83; French playwright; b. Aubusson, Creuse; studied law at Paris, but devoted himself to literature; wrote his first novel, "Rose et Blanche," in connection with George Sand, and published it under the pseudonym of JULES

SAND. In 1853 he was appointed keeper at the Mazarin Library; 1858, was elected to the Academy; most successful novel, "Mlle. de la Seiglière"; best comedy, "Le Gendre de M. Poirier," written in connection with Émile Augier.

Sand Eel, or Sand Lance, any fish of the family *Ammodytidæ*; are elongated, with a pointed snout, forked tail, and silvery body; burrow in sand, and are sometimes employed as bait for other fishes; species found on the shores of all countries; common American species, *Ammodytes americanus.*

Sand'eman, Robert, 1718–71; Scottish religious leader; b. Perth; married daughter of Rev. John Glas (or Glass), founder of a sect called Glassites; became an elder in the congregation; established, 1762, a congregation at London, where they became known as Sandemanians; went to N. America and established a society, 1764, and settled in the following year at Danbury, Conn., where he died; wrote a number of theological and controversial treatises. The Sandemanian Church maintains an existence chiefly at Dundee, Edinburgh, and Danbury, Conn. Among their leading peculiarities, besides several ascetic practices, are the weekly love feast, eaten on Sunday, and the "kiss of brotherhood"; the washing of feet, formerly one of their practices, has been discontinued. They abstain from blood and everything strangled, and practice a kind of communism, so far as the members hold their property subject to the call of the church.

San'derling, species of sandpiper (*Calidris arenaria*), distinguished by the absence of a hind toe, occurring throughout the great part

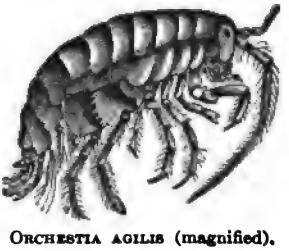
COMMON SANDERLING.

of the world; 7½ to 8 in. long, of a very light gray above, white beneath, with the top of the head, during the breeding season, rufous.

San'ders, or Saunders, Nicholas, about 1527–81; English polemical writer; b. Charlewood, Surrey; became fellow of New College, 1548, and Shaggling Prof. of Canon Law, Oxford, 1557; left England on account of religious innovations of Elizabeth; ordained priest at Rome, 1560; accompanied Cardinal Stanislaus Hosius to the Council of Trent, where he gained great renown by his skill in disputation; went to Poland with Hosius; called to Rome by Pius V, 1572, and sent, 1573, to Madrid, where he was active in organizing an expedition for restoring Catholicism in England, which he accompanied as papal nuncio, 1579. The undertaking failed, and Sanders, pursued by the English, died in a wood near Limerick. Sanders was styled by Anthony à Wood "the most noted defender of the Roman Catholic cause in his time." He was the author of "The Supper of our Lord," a work in defense of the "real presence," in reply to Jewell's "Apology" and Nowell's "Challenge," and in turn answered by the latter in his "Confutation"; "The Rocke of the Churche," "A Treatise of the Images of Christ," directed against Jewell, and of several other polemical works, of which the best known was a Latin treatise against the English Reformation, "De Origine ac Progressu Schismatis Anglicani," which was several times reprinted and translated into French and English.

Sand Grouse. See PTEROCLIDÆ.

Sand'hopper, or Beach Flea, names given, in allusion to their power of leaping, to various amphipod crustaceans found under sea wrack near the high-tide mark. Most of the many



ORCHESTIA AGILIS (magnified).

known species belong to the genus *Orchestia*, as the common species of the New England coast, *O. agilis*. They are known also as sand fleas and shore jumpers.

Sand'hurst, or Ben'digo, city of Victoria, Australia; third in size in the state; 90 m. N. of Melbourne, on Bendigo Creek, 760 ft. above sea level; important railway junction; contains many public edifices, fine botanic garden, and large reservoirs; center of a rich gold-bearing region; district produces highly esteemed wines and considerable quantities of cereals, especially barley; mining gives employment to about 7,000 persons. Pop. (1905) 43,660.

San Diego (săn dē-ā'gō), capital of San Diego Co., Cal.; on San Diego Bay; 480 m. SE. of San Francisco. The bay, discovered by Cabrillo, 1542, is pronounced next in excellence on the Pacific coast to that of San Francisco. The U. S. Govt. has expended a large sum in fortifying the bay, established a marine quarantine station, and built a stone breakwater more than 1 m. long. The first settlement was made May, 1769, when Father Junipero Serra established here the first of the California missions; but the present city dates in growth from 1867, when the new town was begun on the water

front of the bay. The principal industry of the region is fruit and nut culture, inaugurated 1869, and represented by over 2,500,000 trees. The city contains three public parks, one with 1,400 acres; U. S. customhouse, free public library, county hospital, Academy of Our Lady of Peace (Roman Catholic), Board of Trade, and Chamber of Commerce. There are flour and planing mills, large salt works, factories for carriages and wagons, foundry and machine shops, tannery, and other industries. On the peninsula on the opposite side of the bay, and connected with the city by steam ferry, is Coronado Beach, costing nearly $1,000,000. Pop. (1910) 39,578.

Sand Lance. See SAND EEL.

San Domin'go. See SANTO DOMINGO.

Sand'paper, paper one side of which is covered with glue, on which sharp sand or powdered glass has been evenly sifted and is held by the glue when dry. It is made of many grades and degrees of fineness, and is used in smoothing the surface of wood, by the carpenter and joiner, when giving it its final finish.

Sand'piper, common name of the *Tringinæ*, an extensive subfamily of small wading birds of the snipe family. In the typical genus *Tringa* there are between twenty and thirty species, in all parts of the world, some widely diffused, and a few common to America and Europe; they are usually seen in flocks on the

LEAST SANDPIPER.

seashore or on the margin of lakes and rivers, and in marshes. They are generally migratory. Among the American species is the purple sandpiper (*T. maritima*; *arquatella*), found on the shores of E. N. America, and in winter in tropical N. and S. America, and also in the temperate parts of Europe; sportsmen call it the rock snipe, from its frequenting rocky instead of sandy shores. The least sandpiper, or peep (*T. Wilsonii*), the smallest of the group in the U. S., is 5¼ to 6 in. long; abundant over the entire temperate regions of N. America; breeds in the far N., arriving in Massachusetts early in July.

Sand'stone, rock formed of grains of sand, often intermixed with coarse pebbles, cemented together by the infiltration of chalk, clay, flint, or iron-bearing substances. This, with long-continued pressure, has converted the collections of sand into solid rock. Sandstone strata occur through all the geological formations from the metamorphic group upward, and those rocks in which layers of sandstone prevail are often specially designated by this name. The Potsdam sandstone, near the base of the Silurian rocks, is extremely hard, close-grained, and quartzose, often occurring in broad sheets and little intermixed with other strata. A thickness of 70 ft. is exposed in the quarries at Potsdam, N. Y., and large beds of it occur elsewhere in New York, in New England, and in E. Pennsylvania. The general color is yellowish brown, variously shaded. Many other sandstones are extensively employed for building, especially the grits or harder sandstones of the coal measures, usually brownish yellow or whitish, and those of the formations known as the old red and the new red sandstone. The production of sandstone in the U. S., 1906, had a value of $7,147,439, the largest producing states being Pennsylvania, New York, Ohio, California, Colorado, and Massachusetts.

Sandus'ky, capital of Erie Co., Ohio; on Lake Erie at mouth of Sandusky River; 61 m. W. of Cleveland; has one of the best land-locked harbors on the Great Lakes. Sandusky is noted for its fresh-fish industry, which has an annual value of over $1,500,000; its wine production, which exceeds 2,000,000 gallons per annum; its extensive cultivation and shipment of grapes and peaches, and its large receipts of coal by rail, and of iron ore, lumber, and fish by water. The principal manufactures are spokes, hubs, handles, carpenters' tools, engines, boilers, threshing machines, cement, baskets for the grape and peach trade, and casks for wine shipments. There is also considerable ship-building. The fish industry is promoted by a large U. S. hatchery at Put-in-Bay. Pop. (1910) 19,989.

Sand Wasp, common name of a family of fossorial hymenopterous insects, the *Sphegidæ* of Latreille. There are numerous species, generally large, violet blue, sometimes banded with yellow; the females have a sting; there are no neuters, the female making her own nest in the sand.

Sand'wich, seaport of Kent, England; at mouth of the Stour, 12 m. E. of Canterbury; one of the Cinque ports; surrounded by ancient fortifications; has several notable mediæval structures; in the eleventh century was the most famous of English ports. Pop. (1901) 3,174.

Sandwich Is'lands. See HAWAII.

San'dy Hook, low, sandy peninsula in Monmouth Co., N. J.; between the Atlantic and Sandy Hook Bay; beginning at the Navesink Highlands and extending N. about 6 m.; 20 m. S. of Manhattan Borough, New York City; is less than 1 m. in extreme width, and has a beacon light on its N. extremity and a light-

house, 90 ft. high, less than 1 m. S.; formerly terminus of a steamboat line connecting with railway to Long Branch; now used exclusively for U. S. Govt. purposes. Here is the proving ground where ordnance and armor plate are tested, and here is also Fort Hancock, with batteries of modern rifled guns and mortars for defending the entrance to New York harbor.

Sandys (săn'dĭs), **Sir Edwin,** abt. 1561–1629; English statesman; b. Worcester; supported the dynastic claims of King James I, by whom he was knighted, 1603, and employed in several important commissions; member of second Virginia Company; instrumental in securing a charter for the Pilgrims of the *Mayflower* and in establishing representative government in Virginia, thereby becoming obnoxious to the "Spanish party" at court, and was imprisoned, 1621, for having opposed the royal projects in Parliament.

Sandys, George, 1577–1644; English traveler and author; b. Bishopsthorpe, York; brother of preceding; traveled through various parts of the Turkish Empire, 1610–12; published a "Relation" of his journey, with illustrations, often reprinted, and considered of great value by Orientalists; went to Virginia as treasurer, 1621; built the first water mill, and promoted iron manufacture and shipbuilding in Virginia; returned to England, 1624; printed poetical paraphrases of several books of the Old Testament, and translated from the Latin of Grotius the tragedy of "Christ's Passion."

San Feli'pe de Ja'tiva. See JATIVA.

San Francis'co, metropolis and chief seaport of California; coextensive with San Francisco Co.; on the end of a peninsula 6 m. wide and 20 m. long, separating the S. arm of San Francisco Bay from the Pacific; area, 42 sq. m., including, besides the entire end of the peninsula across to the ocean, Goat Island (forty-one acres), 2 m. E. of the peninsula; Alcatraz Island (thirty acres), 1 m. N. of the peninsula; and the Farallones, six rocky islets, 24 m. off shore in the ocean. Nearly half the area consists of high rocky hills, rising in several points to 800 ft. above the sea. The harbor is part of a bay 50 m. long and 5 m. wide, deep, landlocked, and most beautiful. The winds are strong and constant, but rarely violent. Between mean tides the difference is only about 6 ft., so that ships can always load and discharge at the wharves. A large stone dry dock and floating dock give facilities for repairs. By possession of a central position on the W. shore of the continent; the only secure deep harbor between San Diego and the Columbia River, 1,000 m. apart; a situation at the outlet of the only navigable rivers and large valleys of California; the natural end on the Pacific of all the transcontinental railway routes of the U. S.; and by the large extent of tributary territory and its great agricultural and mineral resources, San Francisco has a high metropolitan character.

The city is laid off in rectangular blocks, separated by wide streets. Market Street, which separates the two main surveys, 125 ft. wide and 3 m. long, is one of the most imposing business streets in the world. Among remarkable features are the wharf for Italian fishing boats; the Seal Rocks, with their sea lions at the entrance of the harbor; Sutro Heights, a public pleasure garden; the Sutro bath house; the peculiar climate which permits the fuchsia and geranium to blossom in the open air of midwinter while it compels the wearing of overcoats in midsummer; and Golden Gate Park (1,050 acres), with hill 900 ft. high on the S., and a magnificent ocean beach and surf at its W. end. As an important seaport, San Francisco has a large customhouse, national marine hospital, national military post (the Presidio), and on the N. border of the peninsula and also on Alcatraz and Goat islands, extensive fortifications. Among numerous large manufacturing plants are a rolling mill, machine shops, foundries, shipyards, wire works, ropewalk, planing mills, sugar refineries, and factories for carriages, furniture, boxes, shoes, clothing, tinware, etc. Factory-system plants (1909), 1,796; capital employed, $133,824,000; value of products, $133,041,000. The merchandise imports in year ending June 30, 1911, were valued at $53,885,021; exports, $40,624,903.

The first settlement of white men was made October, 1776, by Spaniards, who established a military post and a mission of Franciscan friars. After the country passed to Mexico, a small village called Dolores, inhabited by Mexicans, grew up about the mission. Another village, called Yerba Buena, was laid off near the best anchorage, 3 m. NE. of the mission, 1835. The occupation of California by the naval forces of the U. S., with an official announcement of permanence, stimulated the growth of Yerba Buena. In January, 1847, the name was changed to San Francisco, and a census showed a pop. of 450. In 1848 the discovery of gold in the Sierra Nevada brought a flood of people from remote countries of the world. Among notable events of San Francisco were five great fires (1849, 1850, and 1851); the formation of vigilance committees which (1851 and 1856) executed criminals by extrajudicial processes; the sand-lot agitation (1878–79). On April 18, 1906, earthquake and fire caused the death of 500 persons and rendered 200,000 homeless. The total area burned was about 4.7 sq. m., and contained some 25,000 buildings, more than sixty of which were churches; total loss, $350,000,000. With characteristic energy the citizens at once began the labor of rebuilding, but were hampered by the scarcity of labor due to the exactions of labor unions. In the same year the San Francisco Board of Education segregated the Japanese school children attending the grammar and primary schools, an act that was interpreted by Japan as a violation of treaty stipulation, and led to Federal suits to enforce the provisions of the treaty with Japan. Pop. (1910) 416,912.

San Francisco Moun'tain, loftiest mountain in Arizona; 12,800 ft.; stands alone, rising abruptly from the Colorado plateau to 5,000 ft., and is a conspicuous landmark from all directions; base, 10 m. across; crest takes form of crescent, with concavity turned to the E. Geologically, it is partly a mountain of erup-

tion and partly a mountain of circumdenudation. Its upper part is composed of lava, extruded before the plain had been degraded to its present level.

Sangal'lo, Giuliano da, 1443–1517; Italian architect; b. Florence; studied engraving; became an engineer; first work as architect was the cloister of the Carmelites of Santa Maddalena dei Pazzi in Florence; built the palace of Poggio Imperiale for Lorenzo the Magnificent, and the Church of the Madonna delle Carceri, of which Lorenzo laid the first stone in 1492; restored the fortifications of the city of Ostia by order of Cardinal Giuliano della Rovere; built a monastery outside the Porta Sangallo, and received the surname of Da Sangallo from this work. At Milan he began the splendid palace for the Duke Moro which war interrupted, and at Loreto the cupola of the Church of the Madonna. He restored the roof of Santa Maria Maggiore at Rome, under Alexander VI; this he is said to have gilded with the first gold from America. He constructed the cloister of the Santi Apostoli in Rome, and designed the beautiful façade of the Church of the Florentines. He was called again to Rome by Leo X to undertake the direction of the building of St. Peter's, but ill health prevented.

San'gha, or **Samgha** (Sanskrit *saṅgha*, "assembly" or "congregation"), monastic brotherhood, community, or order founded by the Buddha; consists of men who have renounced all family ties and all worldly desires, and are pledged to devote themselves to meditation, the recital of the law, self-restraint, and the accumulation of merit in order that they may find deliverance from the round of birth and death; order open to men of all ranks, provided they are over twenty, have the consent of their parents, are free from disease or bodily defect, are not soldiers or in the service of the state, and are not debtors, slaves, or criminals.

Sangir', or Sangi, Is'lands, chain of islands connecting Celebes and the Philippine Islands; between the Sea of Celebes and the Pacific; belonging to the Netherlands; area, 323 sq. m.; pop. abt. 5,000. The largest is Great Sangir, on which is the celebrated Gunong (or volcano) Abu, a superb pyramid, subject to frequent explosions. The islands produce woods, cocoa, sago, rice, trepang, and turtles. The inhabitants are Alfurus, pacific, industrious, in part Christian and Mohammedans, in part pagans. The Taluat Islands to the NE. are sometimes included in the Sangir group. They have a somewhat greater area.

San'greal, Sangraal, or **Ho'ly Grail,** according to mediæval legends, the cup of emerald which held the wine at the first celebration of the Lord's Supper. St. Joseph of Arimathea, it is related, received some of the blood of the Lord in this cup at the crucifixion. In the earliest form of the legend, "Le Petit Saint Graal," composed abt. 1160 and ascribed to Robert de Boron, the brother-in-law of Joseph of Arimathea carries this communion chalice to the West. In "Le Grand Saint Graal" and "La Queste del Saint Graal," ascribed to Walter Map, a gentleman of the court of the English Henry II, it is Joseph himself who brings the Graal to England. These romances connect the legend with the stories of King Arthur, several of whose knights undertake its quest, an adventure finally achieved by the maiden knight Galahad. Galahad takes it back to the East, and on his death it ascends to heaven. In the "Conte del Graal" of Crestien de Troyes (abt. 1190), and the "Parzival" of his German continuator, Wolfram von Eschenbach, Percival is substituted for Galahad as the hero of the Graal legend. The fragment of a Graal romance, "Joseph of Arimathea," exists in English alliterative verse of the fourteenth century.

Sanguina'ria. See BLOODROOT.

San'hedrim, supreme council of the Jews in later times. Its full development took place under the earlier Asmoneans. Its members were chosen from the chief priests, elders, and scholars, and the tradition is that there were seventy besides the *nasi* or president. Its power was nearly destroyed by Herod the Great. According to the Talmud, there was a lesser sanhedrim of twenty-three members in every considerable town of Palestine.

San'itary Commis'sion, The U. S., organization formed during the Civil War to distribute relief to the soldiers of the Union army. On April 19, 1861, the day of Pres. Lincoln's call for 75,000 men, women in Bridgeport, Conn., and Charlestown, Mass., organized societies with the somewhat vague idea of affording relief and comfort to the volunteers. Similar societies were soon formed in other cities and states, and, April 25th, the Woman's Central Relief Association was founded in New York City. A committee of this association presented to the Government their plan, asking for the appointment of a scientific board, to be commissioned with ample powers for visiting all camps and hospitals, advising, recommending, and, if need be, enforcing the best-known and most approved sanitary regulations in the army.

The Government required that the consent of the medical bureau should be obtained before such a commission was appointed. This consent was denied, but a semiofficial commission was created by order of the Secretary of State, June 9, 1861, and established its headquarters in New York City. The commission gave its attention, through skilled medical inspectors, to camp inspection, the choice of camp sites, drainage, and police, and the character and cooking of food; erected after its own models pavilion hospitals designed to make contagion and pestilence less easy and fatal; established soldiers' homes, to take care of the sick and supply defects in the unperfected arrangements of the quartermaster's bureau, organized a system of hospital steamers, and devised a sort of hospital car; from more than 7,000 women's aid societies obtained extra food and clothing; forwarded medical and sanitary supplies to the seats of immediate battle far in advance of the medical department of the army; established a hospital directory of the names of all private soldiers, showing when they entered and left; also a pension bureau.

and war-claim agency, and a bureau of vital statistics.

In the beginning of 1864 a series of great fairs was inaugurated, either by officers of the commission or by its friends, in aid of its treasury. They occurred at Chicago, Cincinnati, Cleveland, Pittsburg, Albany, Baltimore, Boston, Brooklyn, New York City, Philadelphia, and many other towns and cities. The net product reached $2,736,868.84. The total amount in money received from the people by the Sanitary Commission up to May 1, 1866, was $4,962,014.26; but at least $2,000,000 more was raised and expended in its interest by its branches. Free transportation by railway and express companies and communication by telegraph lines saved the commission at least two thirds of the cost in these departments of its work. The aggregate value of the services rendered by the public to the commission was estimated at $25,000,000.

San Jacinto (săn jă-sĭn'tō), river of Texas; rises in Walker Co., and flows SE. 120 m. to San Jacinto Bay, an arm of Galveston Bay; navigable 45 m. On its banks, 2 m. SW. of the junction of the river and Buffalo bayou, the closing battle of the War of Texan Independence was fought, April 21, 1836. Gen. Houston, in command of the Texan forces, had been gradually falling back E., toward San Jacinto River and Bay, before the advance of the Mexican army under Gen. Antonio Lopez de Santa Anna from the W. The armies were marching on parallel lines, Houston's object being to reach the river and hold the ferry at its mouth, Santa Anna's to cut off his retreat and capture him. They reached the bay boundary almost simultaneously, and took position within a mile of each other. On the 20th some skirmishing took place, with but little result. On the 21st, with the cry, "Remember the Alamo!" the Texans made a sudden charge, and at the expiration of an hour Santa Anna had fled, and the whole of his army not slaughtered in the action had surrendered. The force of the Mexicans was 1,536; that of the Texans about 700. The latter had 8 men killed and 25 wounded.

San Joaquin (hō-ă-kēn') **Riv'er**, stream which rises at the foot of a small glacier near the summit of Mount Lyell, on E. border of the Sierra Nevada, Cal., flows SW. for nearly 100 m., then turns NW. and traverses the magnificent valley of same name, and, joining the Sacramento, enters Suisun Bay. At high water the outflow of the Tulare system of lakes is discharged by the San Joaquin, which is navigable to Stockton for large steamers for a good part of the year. The river is some 350 m. long.

San'jo Saneyosh'i, 1836–91; Japanese statesman; b. Kioto, of an old, princely family; early became prominent in state matters, directing his efforts to the restoration of the imperial power; his coöperation at court was invaluable to Saigo and the other leaders of the malcontents in the provinces. After the restoration, 1868, he became vice premier, and, July, 1871, premier, a position which he held until 1886, when he became chancellor.

San José (hō-sā'), capital of Costa Rica and of province of San José; in valley at foot of chain of volcanic mountains; 95 m. from Limon on the Caribbean; is the commercial center of the republic; has a national theater, a cathedral, national library, university, various government buildings, and two fine parks. San José is about 4,000 ft. above the sea, and consequently has a temperate climate; owing to frequency of earthquakes, all buildings are low, and churches are without towers. San José was founded about 1750. Pop. (1907) 26,682.

San José, capital of Santa Clara Co., Cal.; 47 m. S. of San Francisco; in the heart of the beautiful Santa Clara valley; connected with San Francisco by three lines of railway and a waterway through the bay, and with the Pacific at Santa Cruz and Monterey by rail. Chief industry, the preparation and handling of fruit; output of agriculture and horticulture of the valley amounts to over $6,000,000 annually. The pueblo of San José was established 1782 by Spaniards. Under the first constitution of California the state capital was here. The city suffered severely from the earthquake that, with ensuing fire, wrought vast damage in San Francisco, 1906. Pop. (1910) 28,946.

San Juan (hō-ăn'), Spanish, SAN JUAN DE PUERTO RICO, capital and most important city and port of Porto Rico, W. Indies; on a bay of the N. coast, and on a coral island which shelters the bay; has one of the safest and most commodious harbors in the W. Indies, but the entrance is somewhat difficult. Chief buildings the Jesuit College, the cathedral, and the former palace of the captain general; leading exports, coffee and sugar. San Juan was founded by Ponce de Leon, 1511; sacked and burned by the English freebooter Drake, 1595; destroyed by the English admiral Clifford, 1597, which led to the strengthening of its fortifications; unsuccessfully attacked by the Dutch, 1625; later repelled a French and an English attack; bombarded, May, 1898, by Rear Admiral Sampson, while in search of Cervera's fleet. Pop. (1910) 48,716.

San Juan de Fu'ca, Strait of, entrance to Puget Sound and Gulf of Georgia; S. of Vancouver's Island and N. of State of Washington.

San Juan del Norte (dĕl nōr'tā), seaport town of Nicaragua; on the Caribbean Sea, at the mouth of the San Juan River; 190 m. ESE. of Managua; is built on a low, sandy point, backed by swampy lands; the situation is insalubrious; is the only port of importance on the Atlantic side of the republic. Pop. abt. 1,500.

San Juan Riv'er (Nicaragua). See NICARAGUA.

San'key, Ira David, 1840–1908; American evangelist; b. Edinburgh, Pa.; in business at New Castle, Pa., 1855–70, when he joined Dwight L. Moody in evangelistic work in Chicago, Ill. They labored together in Great Britain, 1873–75, and again 1883. He composed several popular sacred tunes, and pub-

lished the compilations "Sacred Songs and Solos," "Gospel Hymns," "Winnowed Songs," etc.

Sankh'ya, the oldest system of Indic speculation. Tradition makes the Sankhya system older than Buddha (older, say, than 500 B.C.), and maintains that Buddha was influenced by it. The designation "enumerative philosophy" was applied to the system because of the importance attached by the Sankhyans to the establishment of their twenty-five principles and to their numerical classifications in general. Its fundamental doctrine is consistent pessimism, closely connected with the widespread belief in transmigration, with its horrible sequence of death after death. In only one way—on this point all the Indic systems are agreed—can one escape the necessity of rebirth, namely, by the recognition of the highest truth. One of the preliminaries to this recognition is a life of complete renunciation. The decisiveness with which the existence of an actual god is denied is one of the characteristic features of the genuine early Sankhya, which is, accordingly, properly called atheistic. The Sankhya recognizes two eternal entities, matter and souls. An offshoot of the Sankhya system is the Yoga philosophy.

San Lazzaro (sän läd'zä-rō), small island of the Venetian lagoons, first mentioned in the twelfth century when a hospital for lepers was established there. After the disappearance of leprosy it was used for other hospital purposes, until the Venetian republic ceded it to Peter Mechitar and his Armenian followers who had fled before the Turks. The Armenian church and convent contain many objects of interest.

San Luis Potosí', capital of state of same name, Mexico, in a valley 6,200 ft. above the sea; 70 m. NNE. of Guanajuato; has a university, school of engineering, mint, etc., with considerable manufactures; is an important railway center. Pop., including suburbs (1900), 61,020.

San Mari'no, oldest and smallest independent republic in the world; in E. central Italy; governed by a legislative senate of sixty, an executive council, a general council of heads of families, and two presidents elected for six months. This has been the form of government since 1847, when the constitution was considerably changed; area, 32 sq. m., embracing five small villages, with pop. of about 11,000. The capital, of same name, is on crest of a mountain 2,635 ft. above the sea. It is said to have been founded early in the fourth century by St. Marinus, a converted stone mason, who fled from Rimini during the Diocletian persecution. Borgo, 500 ft. lower down, is the residence of the principal inhabitants. There is a standing army of 38 officers and 950 men. The principal products are fruit, silkworms, and wine; powder is manufactured.

San Martin (mär-tēn'), **José de,** 1778–1850; Spanish-American military officer; b. Yapeyú, Misiones (now in Argentina); educated in Spain; distinguished himself in the wars with France; attained rank of lieutenant colonel; returned to S. America on outbreak of war of independence, offered his services to the patriot junta, and organized the Mounted Grenadiers; also aided in organizing the Lautaro Lodge, a secret society which became the most important political influence in the country. In 1813 he became commander of the patriot forces in upper Peru or Bolivia. In January, 1817, with 4,000 men he crossed the Uspallata Pass, 12,300 ft. above the sea, and attacked the Spaniards in Chile, winning many victories, notably at Chacabuco, February 12, 1817, and Maypú, April 5, 1818, which secured Chilean independence. In 1820 he marched into Peru, drove the Spaniards into the interior, declared the country independent (1821), and assumed the dignity of protector, but magnanimously resigned it to Bolivar, 1822. The rest of his life was spent in France, in comparative poverty. The independence of S. America was largely due to him.

San Miguel (mē-gĕl'), town of Salvador; capital of department of same name; on the San Miguel River; center of a rich agricultural region (indigo, etc.). Pop. (1906) 24,768. The San Miguel volcano, 10 m. SW. of the town, is 6,000 ft. high, and one of the most active in Salvador.

Sannaza'ro, (sän-nä-dzä'rō), **Jacopo,** 1458–1530; Italian poet; b. Naples; early received great favor from King Frederick III of Naples as a reward for his poems; followed the king into exile, 1501, and did not return until after his death; best-known poem, "Arcadia," a series of idyls, partly in prose, partly in verse. His Latin poems include epigrams, among which is the famous poem in praise of Venice, which gained a reward of 600 ducats from the senate.

San Re'mo, town of Porto Maurizio, Italy; 26 m. NE. of Nice; railway station on line from Genoa to Nice; on a slope descending to the sea, with rich olives behind it, and surrounded by luxuriant orchards of lemons and oranges. There is an old town with steep and narrow streets. The new town is a favorite resort of invalids. Pop. commune (1901) 21,440.

San Sal'vador (republic). See SALVADOR.

San Salvador, capital and largest city of Republic of Salvador, Central America; on a branch of the Lempa; 2,270 ft. above sea; founded 1528; removed to its present site, 1539; damaged by earthquakes 1575, 1593, 1625, 1656, 1798, 1839, 1879, and destroyed 1854, 1873. As rebuilt, all houses and public edifices are low; the cathedral and many other buildings are of wood; has a university, national palace, normal college, national theater, etc., and a thriving trade. Pop. of city proper (1901) 59,540; port, La Libertad.

San Salvador Is'land. See BAHAMA ISLANDS.

Sans-Culottes (sänz'kü-lōt'), name bestowed early in the first French Revolution upon the lower classes of the populace from the fact that they wore pantaloons instead of knee-

breeches, the latter garment distinguishing the dress of the bourgeoisie and nobility.

San'skrit, literary language of the Aryan inhabitants of India. Two principal reasons have led to its study: the intrinsic interest attaching to its extensive Sanskrit literature, which reveals the thought and life of a large and highly endowed race, and the fact that, of all the Indo-European languages, the Sanskrit has, on the whole, best conserved the pristine features of their common parent speech. The application of the comparative method to the study of genetically related tongues is due in largest measure to the study of Sanskrit, which has thus proved to be the most important factor in the revolutionizing of some parts of classical philology and in the creation of Germanic philology.

Originally a vernacular dialect in Hindustan, Sanskrit has for nearly or quite two thousand years been kept artificially in use, like the Latin in Europe, by the transmitted usages of an educated caste, to serve as the means of learned intercourse and composition. Its name (*saṅskṛta*, completed, perfected) denotes it as "the cultivated, elaborated, or perfected form of speech," in distinction from the uncultivated dialects, called Prakrit (*prakṛti*, nature), which sprang from or were contemporaneous with it. The Sanskrit is ordinarily written in a character called *dēvanâgarî*, "divine city," which in its present fully developed form is of a date several centuries later than the Christian era. The ancient alphabet from which it is descended was derived from a Semitic source. The *dēvanâgarî* is written from left to right; it is a complete mode of writing, representing every analyzable sound by a separate sign; it is syllabic, each consonant implying a short *a*, if the sign of no other vowel is attached to it; if more consonants than one are to be spoken with one vowel, their signs are united into a single compound character. As regards the etymological part of grammar, the distinguishing character of the Sanskrit is its remarkable preservation of original materials and processes, the great regularity and consequent transparency of its formative methods. In it the Indo-European roots are more numerously and faithfully preserved than by any other member of the family. The whole system of inflection is most nearly accordant with that of Greek; it is richer in declension, but poorer in conjugation.

The most ancient literature of India comprises the Vedic, and the two epics, the "Mahâbhârata" and the "Râmâyana." The proper Sanskrit literature counts by thousands its works still in existence. The period it covers stretches, if the Vedas be included, from at least 1500 B.C. to our own day. With insignificant exceptions it is all composed in meter. Every department of knoweldge and branch of inquiry is represented in it, with the single exception of history. This exception robs this literature of one great source of worth and interest, and much of it is trivial and tedious. Of epic or quasi-epic poems are the "Raghuvansa" ("Race of Raghu"), "Kumâra-Sambhâva" ("Birth of the War God"), and "Nalodaya" ("Rise of Nala"), all by Kâlidâsa; Magha's "Death of Sisupâla," and Harsha's "Naishadhîya." In lyric and erotic poetry are the "Ritusanhâra" ("Seasons") and "Meghadûta" ("Cloud Messenger") of Kâlidâsa, and the "Gîta-Govinda" of Jayadeva. The "Centuries" of Bhartrihari, and other like works, are aphorismic. Of the collections of fables, the "Panchatantra" has entered almost every W. literature as the fables of Bidpai or Pilpay. A somewhat later collection of the same materials is the "Hitopadesa" ("Salutary Instruction"). The most noted collection of tales is the "Kathâsaritsâgara" ("Ocean of Streams of Narration"). The most celebrated dramas are the "Mrichhakati" ("Toy Cart") of Sudraka, and the different works of Kâlidâsa, as the "Sakuntalâ," the "Urvasî," and "Malavika and Agnimitra."

The Purânas form a separate class of works, being the religious literature of the middle period, later than the Vedic, preceding the modern tantras and shâstras. The law books are a development of a part of the Vedic literature. The most famous is the code ascribed to Manu. Of the scientific literature, the grammar is entitled to the first place. The most ancient extant authority, Pânini, is supreme; the immense grammatical literature is made up almost solely of commentaries on his work. The Buddhist Sanskrit literature is immense. Nearly all there is of true science in the astronomy of the Hindus was learned by them from the Greeks. They have made in arithmetic and algebra remarkable original progress; and the Hindu system of decimal notation has made its way, through the Arabs, to the exclusive use of modern enlightened nations, our usual figures being by origin letters of the Sanskrit alphabet. The medical literature of the Hindus is regarded as well deserving study. Rhetoric, versification, and music are each represented in a department of the literature.

Sanson (sȧṅ-sōṅ'), **Nicolas**, 1600–67; French cartographer; b. Abbeville; was teacher of geography to Louis XIII, afterwards royal geographer, and prepared a great number of maps of the Roman Empire, etc. His two sons, Adrien and Guillaume, succeeded him as royal geographers, and after them followed his grandnephew, Robert de Vaugondy,

Santa Ana, or **Anna, Antonio Lopez de**, Mexican general; b. Talaha; began his military career, 1821, against the royalists; took part in the movements which overthrew Iturbide, Pedraza, Guerrero, and Bustamante; became president, 1833; crushed a formidable insurrection, 1835, and carried into effect a centralizing policy. An insurrection having broken out in Texas early in 1836, he took the field in person, stormed the ALAMO (*q.v.*) and massacred its defenders, but at San Jacinto was totally routed by the Texan army under Houston, April 21st. The next day he was taken prisoner, and his functions were at once suspended by the Mexican Govt. In 1837 he returned to Mexico, and in the defense of Vera Cruz against the

French lost a leg. In the long contention between the Centralists and Federalists he was one of the leaders of the former; and as provisional president was virtual dictator from October 10, 1841, to June 4, 1844, when he became constitutional president. On September 20th he was deposed, and, January 15, 1845, banished; settled in Cuba. In 1846 he was recalled and appointed generalissimo, and, December, made provisional president.

In 1847 he was defeated by Gen. Taylor at Buena Vista (February 22d) and by Gen. Scott at Cerro Gordo (April 18th). After the fall of Mexico (September 14th) he resigned the presidency, and, having made a fruitless effort to retrieve his reputation by the siege of Puebla, sailed for Jamaica, April 5, 1848. In 1853 he returned to Mexico, and again assumed control of affairs, procuring his appointment as president for life by a new revolution. After a struggle of two years against the revolutionary forces of Alvarez, he was compelled to abdicate, and sailed, August 16, 1855, for Havana. He afterwards spent two years in Venezuela, and thence went to St. Thomas. During the French invasion he returned to Mexico, and Maximilian appointed him grand marshal of the empire, but he was afterwards compelled to withdraw. In 1867 he made a last attempt to gain ascendancy in Mexico, but was taken prisoner at Vera Cruz and condemned to death. Juarez pardoned him on condition of his quitting Mexican soil forever, and he settled in the U. S. On the death of Juarez he was permitted to return; died in Mexico City.

San'ta An'a, city of Salvador; 36 m. WNW. of San Salvador; center of the finest agricultural region in the republic, and controls most of the sugar trade; connected with the port of Acajutla by railway; pop. (1901) 48,120. The volcano of Santa Ana, or Lematepec, 11 m. SW., is one of the highest in Salvador (6,614 ft.).

Santa Bar'bara, capital of Santa Barbara Co., Cal.; on Santa Barbara channel; 14 m. E. of Elwood; has regular steamer communication with San Francisco, San Diego, and San Pedro; is protected on the N. by the Santa Ynez Mountains, and from its dry, equable climate has become one of the most noted midwinter health resorts on the Pacific. The city is in an agricultural and stock-raising region, and has large wool, olive-oil, asphaltum, petroleum-oil, and fruit-growing interests. It has beautiful surroundings, with luxuriant roses and tropical plants, a Spanish and a Chinese quarter, and an excellent bathing beach. The Spanish Mission, founded by Junipero Serro, 1786, is within 1 m. of the city, and is still in charge of Franciscan monks. The harbor was first visited by Sebastian Vizcaino, 1603. The presidio established by Gen. Felipe Neve, 1782, was maintained till the arrival of Gen. Frémont. Pop. (1910) 11,659.

Santa Claus. See NICHOLAS, ST.

Santa Cruz, Andres, abt. 1794–1865; Bolivian general and politician; b. La Paz (now in Bolivia); was of mixed white and Indian blood; attained rank of colonel in Spanish army; captured by the patriots, 1820, joined them, rose to be general, and led an invasion of upper Peru, 1826–27. Gen. Sucre, President of Bolivia, having been deposed, Santa Cruz was elected president of that republic for ten years from 1829. Orbegoso, President of Peru, who had been deposed, appealed for aid to Santa Cruz, who (1835) defeated the claimants, Gamarra and Salaverry, and, October, 1836, proclaimed the Peruvian-Bolivian Confederation. This consisted of N. Peru, S. Peru, and Bolivia, each with a president, Santa Cruz himself being chief executive, with title of protector. A Chilean army invaded Peru, and Santa Cruz was defeated at Yungay, January, 1839. He left the country, and the confederation was at once dissolved. He later held diplomatic posts for Bolivia in Europe.

Santa Cruz, capital of Santa Cruz Co., Cal.; on Monterey Bay, at mouth of San Lorenzo River; 75 m. S. of San Francisco. With an average winter temperature of 55° and summer temperature of 62°, a magnificent bathing beach, attractive drives of 10 m. along the sea cliffs, and good roads through mountain scenery to the famous Big Tree grove, 5 m. distant, Santa Cruz is a favorite health resort all the year. The industrial plants include tanneries, foundries, soap and glue works, and planing mills; there are large shipments of powder, lime, and bituminous rock. The city is built on the site of the Santa Cruz Mission, founded by the Spaniards, 1791. Pop. (1910) 11,146.

Santa Cruz Is'lands, archipelago of Melanesia, between the Solomon Islands and the New Hebrides; under British protectorate, but claimed by the French, and very little known; consists of a dozen volcanic islands and many islets; total area about 360 sq. m.; largest island, Santa Cruz, or Nitendi; area, 215 sq. m.

Santa Cruz de Santia'go, or de Teneriffe', capital of the Canary Islands; on the NE. coast of Teneriffe; has an excellent harbor, making the city the chief commercial port of the islands. Wine, brandy, cochineal, tobacco, and agricultural produce are exported. Pop. of commune (1900) 38,419.

Santa Cruz. See SAINT CROIX.

Santa Fé, capital of State of New Mexico and of Santa Fé Co.; 20 m. E. of the Rio Grande, 64 m. NE. of Albuquerque; next to St. Augustine the oldest settlement in the U. S. In older portions of the city streets are narrow and crooked, but in modern portions they are wide and regularly laid out. The principal open space is the plaza containing a soldiers' memorial monument. The city is the seat of a Roman Catholic archbishop. Public buildings include the Governor's Palace, built during the early Spanish régime, which contains the priceless treasures of the New Mexico Historical Society, and the post office, capitol, penitentiary, New Mexico School for the Deaf and Dumb, U. S. Govt. building, county courthouse, St. Vincent's Hospital, and a Roman Catholic orphan asylum. The oldest church, also said to be the oldest in the U. S., is San Miguel, built abt. 1605, destroyed by the Indians, and

rebuilt 1710. The Cathedral of San Francisco is built around a former cathedral dating back to 1622. Educational institutions include St. Michael's College (Roman Catholic), Presbyterian Academy, Academy of Our Lady of Light (Roman Catholic), Catholic school for Indian boys and girls, and a government industrial Indian school. In prehistoric times the place existed as an Indian pueblo or town. Abt. 1605 it was occupied by the Spaniards, who gradually reduced the Indians to slavery. In 1680 the Indians expelled the Spaniards, who under Vargas recaptured the pueblo, 1692, and the territory was held by Spain till 1821, when Mexico declared its independence. In 1846 U. S. troops under Gen. S. W. Kearny took possession of the city; 1848, the territory was ceded to the U. S.; 1851, Congress created the Territory of New Mexico, with **Santa Fé** as its capital. Pop. (1910) 5,072.

Santa Fé de Bogotá'. See BOGOTÁ.

Sant-Aldegondé. See MARNIX, PHILIPP VAN.

San'tal Wood, San'ders, or Saunders. See SANDAL WOOD.

San'ta Maura (mow'rä), modern Greek, LEVCADA; ancient, *Leucadia* or *Leucas*; one of the Ionian Islands, Greece, separated by a strait 1 m. wide from the W. coast of Acarnania; area, 180 sq. m.; pop., 31,769; traversed N. and S. by a limestone ridge, terminating SW. in Cape Ducato (the ancient LEUCAS, famous for Sappho's leap), and culminating near the center of the island in Mount St. Elias, 3,750 ft. high; principal exports: oil, wine, and salt; capital, Amaxichi, also sometimes called Santa Maura. The ancient Leucas derived its name from the limestone cliffs.

Santa'na, Pedro, 1801–64; Dominican military officer; b. Hincha, Santo Domingo; headed the Revolution of 1844, by which the E. part of the island became independent of Haiti; President of the Dominican Republic, then formed, 1844–48; repulsed the invasion of Soulouque, 1849; deposed Jimenes, and was president for a short time; president by regular election, 1853–57; again defeated Soulouque, 1855 and 1856; again president, 1858, but, despairing of bringing about order, ceded the republic to Spain, 1861; appointed lieutenant general in the Spanish army.

Santander', Francisco de Paula, 1792–1840; New Granadan military officer and statesman; b. Rosario de Cucuta; served through the war for independence; commanded a division in invasion of New Granada, and enabled Bolivar to gain the victory of Boyaca, 1819; promoted general of division on the field; appointed Vice President of Cundinamarca; elected Vice President of Colombia under Bolivar, 1821; re-elected 1827. After Bolivar's return in that year he led the Federalist opposition to him, and when Bolivar assumed dictatorial power (1828) Santander was deposed. On a charge (never proved) of conniving at an attempt to assassinate Bolivar he was banished, and went to Europe. In 1831, after the dissolution of the Republic of Colombia, he was invited to return. Before his arrival he was elected President of New Granada, 1832, and held the post until the beginning of 1837. Later he was a member of Congress.

Santee' Riv'er, stream formed in South Carolina by the union of the Wateree and Congaree; 150 m. long and navigable throughout for steamboats; reaches the Atlantic through the N. and the S. Santee.

Santerre (sän-tär'), **Antoine Joseph,** 1752–1809; French revolutionist; b. Paris; was a brewer by trade; acquired influence by wealth and generosity; as commander of a battalion of the National Guard, took part in the storming of the Bastile, 1789; attack on the Tuileries, 1792, and the insurrection of August 10th; commander in chief of the National Guard of Paris, 1792–93; in summer of 1793 was made a general of division and sent to the Vendee at the head of an army, but was beaten at Coron; recalled and arrested as an Orleanist; did not regain his liberty till after fall of Robespierre.

Santi (sän'tē), **Giovanni,** d. 1494; Italian painter; father of Raphael Sanzio; b. Castello di Colbordolo, Urbino; best-known work, the fresco in the Dominican church at Cagli (1482). The Brera at Milan and the National Gallery in London possess examples of his art.

Santiago, or **Santiago de Chile** (sän-tē-ä'gō dā chē'lā), capital of Republic of Chile; 68 m. ESE. of Valparaiso, its port; 1,755 ft. above sea; most populous city on the Pacific slope of America except San Francisco; center of Chilean wealth, fashion, and culture; exhibits more luxury and taste in building than any other capital of S. America. The Alameda, a very wide street, crosses the city and is its main artery; is ornamented by four rows of trees, with a central promenade and two driveways, and set at intervals with statues, some of them spoils of the Peruvian War. The cathedral, municipal buildings, etc., face the Plaza de la Independencia. Among other public edifices are the Hall of Congress, mint, opera house, said to be the finest in America, and Exposition Hall. There are several public parks, and a well-stocked botanical garden. Santiago has a renowned university and other institutions of higher education, national library, museum, academy of fine arts, observatory, etc. Commercially it yields in importance to Valparaiso. Santiago was founded by Valdivia, conqueror of Chile, 1541. Earthquakes are frequent, but have never been destructive. Pop. (1905) 531,016.

Santiago de Composte'la, name given to James, son of Zebedee, as patron saint of Spain.

Santiago de Cuba (kö'bä), "old book" formerly ST. JAGO DE CUBA, city; on a bay near the E. end of Cuba; capital of province of same name. The harbor is one of the finest in the W. Indies, but it is separated from the interior by rugged mountains, which retard communication. The city has several fine squares and public gardens, large iron foundries and tobacco factories, and is the center of the Cuban copper region. Sugar, rum, cof-

fee, cacao, fruits, and copper ore are exported. In the Spanish-American War, 1898, the city, its environs, and its sea approach were the scenes of actions that decided the war. Pop. (1907) 45,470.

MILITARY OPERATIONS

During June, 1898, Gen. Garcia, with about 4,000 Cubans, arrived in the vicinity of Santiago, and some 21,000 U. S. troops, under Gen. William R. Shafter, began their march on the city. On June 24th the Spaniards, who had been driven from a strong position at Daiquiri, attempted to check the American advance at Las Guasimas, a point near Sevilla, opposing more than 2,000 men to somewhat less than 1,000 American troops, but the latter carried the position by assault, the Rough Riders coming under fire for the first time, and the enemy retreated toward Santiago. By June 30th the American lines extended to El Caney, a fortified height N. of the city. This was carried by assault, July 1st, by the infantry of Chaffee's, Bates's, and Miles's brigades, of Lawton's division. On the same day troops under Gens. Sumner and Kent waded the San Juan River, SE. of Santiago, drove the Spaniards from their works on San Juan Hill, and occupied those on the crest, the Rough Riders and the First and Tenth Regulars displaying remarkable courage. The capture of these important outlying positions sealed the fate of Santiago.

Assaults on the American lines, July 2d, and an attempt to recapture San Juan Hill resulted in great loss to the Spaniards, and a renewal of the battle, July 3d, gave the Spaniards no advantage. Meanwhile, Gen. Shafter had demanded the surrender of Santiago, and the Spanish fleet, which had been aiding the land forces with its fire, had made its hopeless sortie from the harbor. The total American losses, July 1st, when the contest was heaviest, were 1,514; those of the Spaniards much heavier. Gen. Shafter's demand was rejected, but an armistice was concluded, and extended until July 10th, on which day and the following the Spanish defenses were fired on by the guns of the artillery and of the fleet. On July 17th the city, the fighting army, and the garrisons of Santiago and several minor towns, were surrendered, the troops involved in the capitulation numbering over 22,000, all of whom were sent back to Spain by the U. S. Govt.

NAVAL OPERATIONS

The naval battle of Santiago was fought July 3, 1898, off the coast, between an American fleet under Rear Admiral William T. Sampson (Commodore Winfield S. Schley being second in command), and a Spanish fleet under Rear Admiral Pasquale de Cervera. The American vessels were the *New York* (flagship), *Indiana*, *Oregon*, *Iowa*, *Texas*, *Brooklyn*, two auxiliaries (*Gloucester* and *Vixen*), and the torpedo boat *Ericsson*. The Spanish vessels were the *Infanta Maria Teresa* (flagship), *Vizcaya*, *Cristobal Colon*, *Almirante Oquendo*, and the torpedo-boat destroyers *Pluton* and *Furor*. Gen. Shafter, having demanded the surrender of the city and threatened to bombard it, July 6th, if his demand was ignored, Admiral Cervera attempted to escape from the harbor, not expecting to save all of his ships, but hoping that the *Cristobal Colon*, originally his flagship, would get away. At 9.35 A.M. the vessels came out in column, and attempted to escape to the W., steaming at a speed estimated at 8 or 10 knots, which carried them rapidly past the blockading vessels, distant about 800 yds., and the battle developed into a chase. Within twenty minutes from the time it emerged the *Furor* was beached and sunk in the surf, and about the same time the *Pluton* sank in deep water; by 10.30 the *Maria Teresa* and the *Oquendo*, burning with fires that could not be extinguished, ran on the beach, the one 6½ m. from the harbor, the other 7 m.; soon after 11 the *Vizcaya* was beached at Aserraderos, burning fiercely.

The rescue of the men from these burning vessels occasioned some of the most daring conduct of the day. The only vessel remaining, the *Cristobal Colon*, after a chase by the *Brooklyn*, *Oregon*, *Texas*, *New York*, and *Vixen*, received the heavy fire of the *Oregon*, and, having hauled down her colors, ran ashore, uninjured, at Rio Torquino, 48 m. from Santiago. The Spanish loss amounted to several hundred from gun fire, explosions, and drowning, besides 1,200 prisoners, including Admiral Cervera; American loss, one killed, two wounded. The *Vizcaya* was floated September 24th, but was lost in a tornado November 1st. The *Oquendo*, owing to treachery after the surrender, suffered damage by the opening and breaking of her sea valves, and sank in shoal water. Subsequently friends of Commodore Schley contended that the credit for the victory was solely due to him, and a controversy arose, which led that officer to apply for a court of inquiry.

Santillana (săn-tēl-yä'nä), **Inigo Lopez de Mendoza** (Marquis of), 1398–1458; Spanish military officer and poet; b. Carrion de los Condes; son of the grand admiral of Castile; created marquis for services in wars against Aragon and the Moors; after battle of Olmedo against the King of Navarre, 1445, received title of Conde del Real de Manzanares; best-known work, a collection of 100 proverbs in rhyme.

San'to Domin'go, or Domin'ican Repub'lic, republic occupying the E. and larger part of the island of Santo Domingo, W. Indies; area calculated at 18,045 sq. m.; pop. est. at 610,000. The boundary with Haiti is uncertain and liable to change. The richer and more influential class is largely composed of descendants of Spaniards, more or less mixed with Indian, and to some extent with negro, blood. The mass of the population is a mixed race, with white, Indian, and African blood in about equal proportions. Spanish is the common language, though French and English are also used in the coast towns. Chief cities: Santo Domingo (capital), Puerto Plata (principal port), Santiago, La Vega, and Samaná. The government is theoretically a constitu-

tional republic. The president and vice president are chosen for four years by universal suffrage, and are eligible for immediate reelection. State religion, Roman Catholic, but other forms are permitted under restrictions. Primary education is free and obligatory, at least in theory. There are over 300 municipal schools for primary instruction, with about 10,000 pupils, superior, technical, and normal schools, and a professional school having the features of a university. Agriculture, grazing, and forestry are almost the only industries; chief agricultural products are tobacco, coffee, cacao, sugar, a little cotton, and maize, beans, and manioc for home consumption. Iron, gold, copper, coal, salt, asbestos, phosphate, and other minerals are found. Logwood, lignum vitæ, satinwood, mahogany, and fustic are obtained in the forests. Principal exports: tobacco, coffee, sugar, hides, and cabinet woods. More than half the trade is with the U. S. The circulating medium consists mainly of silver coins from Spain, Mexico, the U. S., France, and England.

In 1795 Spain transferred the island to France. The French were driven out by Toussaint L'Ouverture, 1801, and for a time the whole island was an independent country under his rule. In 1802 it was again occupied by the French, who remained masters of the E. part until 1809, when Santo Domingo and Samaná were taken by the English and turned over to Spain. A revolt, 1822, again united the whole island in the Republic of Haiti; another revolution was followed, 1844, by formal separation from Haiti and the establishment of the Dominican Republic, Gen. Pedro Santana, principal leader of the Dominicans in the war for independence which followed, becoming the first president. In 1861 Santana betrayed the country by ceding it to Spain, but, 1865, the Spaniards were driven out. In 1869 Pres. Baez signed with Pres. Grant two treaties, one for the annexation of Santo Domingo to the U. S. and the other for the cession of the Bay of Samaná, but the U. S. Senate refused to ratify either. In 1901 the government took the collection of its customs receipts out of the hands of an improvement company of New York City. The dispute caused by this action was submitted to arbitration, and, 1905, an agreement was made by which officials of the U. S. Govt. collect and apply these receipts to payments on foreign debts and to local expenses. See HAITI.

Santo Domingo, capital and most important city and port of the Dominican Republic, W. Indies; on bay on S. coast; at mouth of the Ozama River; founded by Bartholomew Columbus, 1496; is the oldest existing town of European origin in the New World. A fine statue of the discoverer adorns the principal square. In the cathedral is shown a crypt supposed to contain the remains of Christopher Columbus. They were brought from Spain and buried in this cathedral, and it is claimed that the bones transferred to Havana, 1796, were those of another member of the family. Santo Domingo exports coffee, sugar, cabinet woods, etc. Pop. 12,000.

San'tonin, crystallizable principle obtained from the drug *Santonica*, or Levant wormseed; occurs in flat, quadrilateral, colorless prisms; is inodorous and nearly tasteless, and practically insoluble in water. In overdose it is poisonous to the animal system, producing convulsive tremblings, dilatation of the pupils, and enfeebling of the functions of the heart and lungs, and produces yellow vision by staining the humors of the eye, the field of view appearing as if seen through a yellow-tinted medium. Santonin is poisonous to the round worm, a parasite infesting the intestines in man, and so is used as a vermifuge.

Santorini (sän-tō-rē'nē), or **Thera** (thā'rā), Greek islands in the Ægean Sea; most S. of the Cyclades; area about 32 sq. m.; is crescent shaped, being the E. portion of the circumference of a vast crater. A prodigious volcanic eruption occurred 1866–68. On some of the rocks may be seen the most ancient specimens of Greek writing known. Capital, Thera. Pop. of islands, about 15,000; of Thera, about 1,000.

San'zio, Raphael. See RAPHAEL.

São (sowñ), **Car'los.** See CAMPINAS.

São Francis'co Riv'er, river of Brazil, rising in Minas Geraes, flowing N., then NNE., and finally curving to ESE., and entering the Atlantic in lat. 10° 29′ S.; length about 1,800 m. It traverses the states of Minas Geraes and Bahia, and below its great bend separates Bahia and Sergipe on the S. from Pernambuco and Alagoas on the N. Its most remarkable feature is its division into an upper and a lower course by a series of rapids and a great cataract. These mark its descent from the plateau, after it has attained its full volume, only 200 m. from the sea. The cataract of Paulo Affonso is sometimes called the Niagara of Brazil, and it approaches Niagara in grandeur, though differing greatly in appearance. It forms three successive falls, with a total depth of 265 ft. Above the falls there is a navigable space from Pirapora to Sobradinho, 984 m. Of the numerous affluents the most important are the Paraupeba and Rio das Velhas on the right and the Paracatú, Urucuya, Carinhanha, Corrente, Rio Grande, and Rio Preto on the left. All of these are navigable for greater or less distances. The São Francisco was opened to free navigation 1867.

São Luíz'. See MARANHÃO (city).

São Miguel (mē-gĕl'). See ST. MICHAELS.

Saône (sōn), river of France; rises in department of Vosges, 1,299 ft. above the sea, flows S., and joins the Rhone at Lyons; length, 282 m.; navigable for 170 m. below city of Gray, Haute-Saône; joined by the Doubs on the left.

São Paulo (sowñ pow'lō), capital of State of São Paulo, Brazil; on branch of Tiete River; 236 m. WSW. of Rio de Janeiro; 38 m. from its port of Santos; healthful climate; has aspect rather of a European than of a Brazilian town. The old Jesuit college is used as the state assembly building; other notable edifices are the São José Theater, city hall,

episcopal palace, and many churches, including some of Protestant denominations. The law school is the most famous in Brazil. São Paulo is the center of the extensive state railway system, and has a large and constantly increasing trade. The city was founded as a mission station (Piratininga), 1554, by the Jesuit Anchieta; became the capital, 1681. Pop. (1900) 64,934.

São Sal'vador, or **San Salvador** (Brazil). See BAHIA.

São Vicen'te. See SANTOS.

Sap, water contained in living plants, together with the substances dissolved in it. All active plant cells have more or less water in their protoplasm, and when there is a surplus it is in the form of drops or masses in cavities (vacuoles) in the protoplasm. Intercellular spaces and the cavities of inactive internal cells also may contain water, holding various substances in solution. In terrestrial plants this water is absorbed by the roots from the water of the soil, and carries with it the substances dissolved in it. In the plant it is absorbed from cell to cell, suffering in each a loss of such substances as are appropriated by the protoplasm, and gaining such as are soluble. It thus contains many substances, some of which are organic, *e.g.*, sugar, inulin, etc., and others inorganic, *e.g.*, salts of lime, potash, etc. By puncturing (as in the maple), crushing (as in the cane), or slicing and diffusion (as in the sugar beet), the sap is obtained in large quantities, and on evaporation yields much sugar, with many other substances. There is no such thing as crude sap or elaborated sap, as commonly understood, nor is there a circulation of sap, one current going up and another coming down. The popular notion that the sap goes down into the roots of trees in the fall and rises again in the spring is erroneous.

Sap'ajou, name corrupted from a S. American term, and applied to New World monkeys of the family *Cebidæ*; also the small monkeys of the genus *Cebus*, and to the spider monkeys, *Ateles*.

Sapan' Wood, dyewood afforded by *Cæsalpinia sapan*, imported from the E. Indies and used to dye red on cotton. The genus is also found in central and S. America and the W. Indies.

Sap Green, coloring matter obtained from the juice of berries of the buckthorn (*Rhamnus catharticus*); native of Europe, but has made its way to the U. S., and grows wild in some parts. It is a shrub 6 or 8 ft. high, with branches that terminate with thorns; used chiefly as a water-color pigment; is not permanent.

Sapodil'la, or **Nase'berry,** fruit of *Achras sapota*, a W. Indian tree of the family *Sapotaceæ*; highly valued as a dessert fruit.

Sap'onin, or **Stru'thin,** uncrystallizable substance, obtained from the soapwort or bouncing bet (*Saponaria officinalis*); also contained in many other plants. Bucholz found thirty-four per cent in the dry soapwort root. By first extracting the root with water and evaporating, then treating the extract with alcohol, a solution of saponin is obtained nearly pure. It is said to be poisonous, and to produce an extraordinary local paralysis of the muscles, without acting through the general nervous system, when injected into the cellular tissue of animals.

Sa'por I, Persian king; reigned abt. 300 A.D.; belonged to the dynasty of the Sassanidæ, which ruled Persia for about four hundred years; most noteworthy achievement, his successful war with the Romans, in which he defeated, took captive, and put to death the Emperor Valerian.

Sap'pers, Mi'ners, and Pontoniers', engineer troops. The first company of sappers was organized in France abt. 1690 as a free company by and under the command of Vauban. It was armed and drilled as infantry, and instructed in all works appertaining to sieges. In defense the men were taught to adjust and sod slopes, place various obstacles, such as palisades, fraises, etc., and repair defenses when injured by the enemy's artillery. All of these duties are still performed by sappers. Three engineers, Goulon, Esprit, and Mesgrigny, organized 1679, 1695, 1705, respectively, each a company of miners, whose duties were the construction and service of mines and countermines. By 1705 these companies, as well as the sappers, had been attached to the artillery. In 1793 they were permanently attached to the engineers. The duties of pontoniers, or constructing temporary military bridges, had up to 1793 been performed by "artillery workmen." The necessity of a better organization was evident, and companies of pontoniers were organized, continuing, however, to form part of the artillery. The numbers of these troops were increased from time to time as the necessities of the service demanded.

In Great Britain the Corps of Royal Sappers and Miners was established 1812. It performed the duties of pontoniers, as well as those indicated by its title. It was composed entirely of enlisted men, the officers being detailed from the Royal Engineers. In 1856 the two corps were consolidated under the name of the Corps of Royal Engineers. In Prussia a company of pontoniers was created 1715, and placed under the orders of the artillery. In 1742, Frederick the Great organized two companies of miners, which were at first attached to a regiment of pioneers, and afterwards formed an independent corps. Previously to 1810 there were no regular sappers in the Prussian army, but in that year the pontoniers and miners were placed under the engineers and took the name of pioneers, a part of their duties being those of sappers.

In the U. S. a company of "bombardiers, sappers, and miners" was attached to the Corps of Engineers by act of Congress, April 29, 1812, but was discontinued in the reorganization of 1821. In 1846 a company of "sappers, miners, and pontoniers" was organized as part of the Corps of Engineers, was sent to Mexico with the army of invasion, occasionally fought with muskets, and once did excellent

service as infantry. After the war it was stationed at West Point to assist in the instruction of cadets. Detachments did work in various parts of the W. up to the Civil War. The main portion of the company was engaged during the summer of 1861 in the defense of Fort Pickens. In the fall of 1861 it joined the Army of the Potomac. An act of Congress, 1861, added three companies, of 150 men each, to the engineer troops, and authorized one company of topographical engineers. In 1863 the Corps of Engineers and of Topographical Engineers were merged into one, and the strength of the battalion of engineers thus became five companies. From the fall of 1861 until the end of the Civil War the battalion formed part of the Army of the Potomac, and its services were invaluable. A number of volunteer regiments were organized as engineer troops, and in addition to these many infantry and artillery troops served as engineer soldiers when occasion required. For mining at Vicksburg and Port Hudson practical miners were selected from the different regiments, and temporarily organized as military miners.

The most remarkable feats in this branch of the service during the war were, in mining, the Petersburg mine (July, 1864); in sapping, the siege of Fort Wagner before Charleston, July to September, 1863; and in pontoniering, the bridge across the James River at Charles City Courthouse. The latter was over 2,000 ft. long in pontons, besides 200 ft. of trestle work. It was built by about 450 men in about five hours on the evening of June 15, 1864, the approaches having previously been prepared. The stream was rapid and deep, in some places 85 ft. This was the longest floating bridge ever constructed by an army in the field. On the reduction of the army, 1870, the number of enlisted men in the battalion of engineers was limited to 354; 1875, the number was further reduced to 200. After 1884 the number was increased, and, 1908, amounted to about 1,300. Nearly all of these were stationed at the Engineer School of Practice at Willets Point, N. Y. The officers of the battalion are temporarily detailed from the Corps of Engineers, usually serving with it four or five years.

Sapphire (săf'ĭr), precious stone, next in value and hardness to the diamond; is a transparent variety of corundum, composed of nearly pure alumina. It receives different names according to color, the red sapphire being the Oriental ruby; the amethystine, Oriental amethyst; the yellow, Oriental topaz; the green, Oriental emerald; while the term sapphire alone is commonly applied to the blue variety. The Greek sapphire was not the gem here described, but the lapis lazuli. The blue sapphire is the *huakinthos* of the Greeks and the *hyacinthus* of Pliny. The ruby was probably included in the *anthrax* of Theophrastus and the *carbunculus* and *lychnis* of Pliny. The chemical formula of sapphire is Al_2O_3, with a small quantity of oxide of chromium, on the varying proportions of which the color of the different varieties depends. The sapphire crystallizes in the rhombohedral system, has a vitreous luster, often pearly in the basal planes, and sometimes, when viewed in the direction of the vertical axis, exhibits a bright opalescent star. All sapphires, or pure varieties of corundum, are exceedingly tough and hard, being rated nine on the scale of hardness, the diamond being ten. The gem is found in various parts of the world, and in different geological formations. The finest ruby sapphires come from Pegu, Burma, and Siam; the finest blue sapphires from Ceylon. Asteria is a variety of sapphire which, when cut round, shows a star of brighter rays, due to its crystalline structure.

Sappho (săf'ō), Greek poetess; flourished abt. 600 B.C. From Mytilene, where she lived, she was compelled by persecution to flee to Sicily. The common story that, being in love with a youth named Phaon, she leaped in despair from the Leucadian rock, probably originated in the myth of the love of Aphrodite for Adonis, who is called Phaon by the Greeks. Her poems are principally erotic compositions for the single voice, but she also wrote on a variety of other subjects, serious as well as satirical. Only one complete ode, that to Aphrodite, and a number of short fragments, remain.

Sapporo (săp'pō-rō), town in Yezo, Japan; once the capital of the island; in a plain about 20 m. from the mouth of the Ishikari River; has planing mills, silk factories, and an agricultural college. A mission from the U. S., with Horace Capron at its head, was located here, and professors from the U. S. were intrusted with the organization of the college. Its port is Otaru, 22 m. distant, with which it is connected by a railway. Pop. (1903) 55,304.

Sap'roller, in military engineering, a large gabion filled with another gabion of less diameter as well as with fascines. It is used by sappers, who roll it before them in digging a sap to protect them from the fire of the enemy. A wicker gabion is preferred to an iron one.

Sap'rophytes, plants which live on the organic matter of dead plants or animals, or at least on their dead parts, as distinguished from parasites which live on and obtain their food from living plants or animals. They are all colorless plants, or at least they are not green, and have suffered a greater or less structural degeneration. Saprophytes occur in four of the six great branches of the vegetable kingdom. Thus of the protophytes, some of the bacteria are saprophytes. Of the phycophytes, the black molds (*Mucoraceæ*) and the water molds (*Saprolegniaceæ*) contain many saprophytes. In the carpophytes there are thousands of species of saprophytes, in many of the families of the fungi of the great classes *Ascomycetes* and *Basidiomycetes*, the latter represented by the toadstools, puffballs, etc. The Indian pipes (*Monotropa*) and their relatives are doubtfully saprophytic, and the same may be said of a few of the orchids. On the other hand, many farm and garden plants under cultivation are partially saprophytic. The saprophytes in the vegetable kingdom are estimated at from 20,000 to 30,000 species, the greater portion of which are carpophytes.

Sap Rot. See DRY ROT.

Sap'sucker, yellow-bellied woodpecker (*Sphyrapicus varius*) of N. America, so named on account of boring into maple or other sweet-sapped trees to obtain the sap. It is readily recognized by its black throat and decidedly yellow under parts.

Sap'wood. See ALBURNUM.

Saqqa'rah, or Sakkarah, village of Egypt, W. of site of Memphis, which has given its name to a group of pyramids and to the ancient necropolis of Memphis. The most notable objects at Saqqarah are the Step Pyramid, the tombs of the Apis bulls, and the tombs of early nobles, such as Ti and Ptahhotep, of the fifth dynasty. From Saqqarah came the oldest mummy in the world, that of a son of Pepi I of the fifth dynasty, probably above 6,000 years old.

Saracen'ic Art, art of the countries ruled by the Saracens. The Arabs who followed Mohammed and his earlier successors had no fine art. The Byzantine style became their type in architecture. The workmen of Syria and Egypt developed new fashions under the new dominion. Saracenic art therefore includes the earlier work of Syria, Egypt, Asia Minor, the islands, such as Cyprus and Rhodes, and, in its largest extension, of the N. African coast and of S. Spain, all from abt. 700 to 1400 A.D.

Sar'acens, name orginally applied to a tribe or tribes inhabiting the E. slopes of the Serat, the great mountain chain of Arabia which reaches from Syria to Yemen. Later Greek and Latin authors used this local name to designate the troublesome Bedouin tribes on the S. frontier of the empire, or even the Arabians as a whole. After the rise of Islam, the use of the word came to include the followers of the new faith, wherever they might be. It has also been used as a synonym for infidel (gypsies, pagan Prussians, etc.). See MOORS.

Saragos'sa (Spanish, ZARAGOZA); ancient, *Cæsarea Augusta*; capital of province of Saragossa, Spain; on the Ebro, 176 m. NE. of Madrid; founded by the Phœnicians; under the Romans and Moors was a flourishing city; reached height of its prosperity when (1118) it became capital of Kingdom of Aragon. After reunion of Aragon and Castile, when Madrid became the royal residence, Saragossa lost some of its splendor, and it was nearly destroyed by the French, by whom it was twice besieged (1808–9) during the Peninsular War; 60,000 lives were lost during the siege, mainly by disease. Of the two cathedrals, one contains a pillar on which, it is said, the Virgin descended from heaven, 40 A.D. Saragossa has a university (1474), academy of science, library, law school, and medical school. Cloth, chocolate, silk, soap, and hats are the principal industrial products. Pop. (1909) 99,118.

Saragossa, Maid of. See AGUSTINA.

Sarasva'ti (*i.e.*, "river of pools"), name of several streams of India; principal one, a string of pools 125 m. long (losing itself in the sand several times and often dry in places), which rises in the Siwalik hills in the SE. Punjab and empties into the Ghuggur; is the sacred river of the "Rig-Veda," where it is referred to as "the finest of the seven sisters," "the first in beauty and abundance."

Sara'toff, city of Russia; capital of Government of Saratoff; on the Volga, 450 m. SE. of Moscow; has two cathedrals, museum with fine-art gallery and library; manufactures cloth, linen, tobacco, leather, earthenware, rope, etc.; has large breweries, distilleries, vinegar factories, and foundries, and carries on an extensive trade in grain, cattle, and fish. Pop. abt. 132,000.

Sarato'ga, or Still'water, Bat'tles of, engagements in the Revolutionary War, occurring 12 m. from Saratoga Springs, N. Y. Burgoyne, commanding British forces, had crossed the Hudson, September 13–14, 1777, and encamped on the heights and plains of Saratoga. Gates, commander of an American force, had meanwhile fortified Bemis's Heights, S. of Saratoga. On September 19th Burgoyne attacked the left wing of the American army under Benedict Arnold, and succeeded in holding the field, but with loss of over 500 men. His fleet of boats, laden with supplies, having been captured, his communications with Canada having been destroyed, expected aid from Sir Henry Clinton not have arrived, and as his provisions were nearly exhausted, he was in danger of being cut off from retreat, and therefore determined to risk a battle. On October 7th he advanced with 1,500 men and six pieces of artillery, and was attacked on the right by a New Hampshire brigade and Morgan's riflemen. Arnold, who had been relieved from command after the battle of Bemis's Heights, owing to some misunderstanding with Gen. Gates, and acting without orders, placed himself at the head of the troops. The British lines were repeatedly broken, and the Americans gained a lodgment in the camp, when darkness put an end to the conflict. Afraid of being surrounded, he continued his retreat to Saratoga, and receiving no aid from Clinton began negotiations for capitulation. On the 17th terms were agreed upon. The British were to march out with the honors of war and be permitted to embark for England on condition of not serving again during the war. Besides 5,752 prisoners, about half of Burgoyne's army, forty-two guns, over 4,000 muskets, and a large supply of ammunition were surrendered. Congress would not ratify the agreement, and, though allowing Burgoyne and several other officers to return to England, retained his army until the close of the war.

Saratoga Springs, village in Saratoga Co., N. Y.; 38 m. N. of Albany; in the foothills of the Adirondack Mountains; is one of the most famous summer resorts; also widely known for the political conventions that have been held here. There are nearly forty mineral springs. They are alterative, diuretic, cathartic, and tonic, and the waters are shipped to all parts of the world. Four miles E. is Saratoga Lake, a favorite place for regattas. The Saratoga Racing Association has grounds near the village, with a mile track. A dozen large hotels,

and numerous small ones, have accommodations for 40,000 guests. The principal industries are the bottling of mineral waters and the manufacture of medical supplies. The name Saratoga is derived from the Indian, meaning "Hillside of the Great River." The territory was deeded by the Indians to the Dutch, 1684. Rip van Dam was the first white owner of the original springs, and Sir William Johnson was the first who thoroughly tested their efficacy. The first hotel was established 1774. The Saratoga battlefield is 12 m. SE. of the village. Pop. (1910) 12,693.

Sarawak', British dependency on the NW. coast of Borneo; granted, 1842, to Sir James Brooke, with the title of rajah, by the Sultan of Brunei. He was succeeded, 1868, by his nephew, Sir Charles Brooke, and, 1888, the state was placed under the protection of Great Britain; area, 42,000 sq. m.; pop. abt. 500,000, consisting of native races.

Sarcey (sär-sā'), 1828–99; French author; b. Dourdan; dramatic critic for Paris journals; esteemed for his independence of judgment and his wide acquaintance with dramatic literature and the history of the stage; published "History of the Siege of Paris," "The Word and the Thing," philosophical conversations, "Recollections of Youth," "Recollections of Mature Age," "The Theater," etc.

Sarcocol'la, nauseous gum resin produced by *Penæa sarcocolla, P. mucronata, Sarcocolla vulgaris*, etc., evergreen shrubs of the order *Penæaceæ*, ranging from the Euphrates to the Cape of Good Hope.

Sarcoph'agus, primarily a limestone found in Assos in the Troad, used for making coffins which were supposed to have the property of destroying the corpse within a brief period. The name came thus to be applied to all stone coffins, and loosely also to any large coffin. The earliest specimens are those of Egypt, which were made of granite, basalt, limestone, alabaster, and jointed wood. From the Middle Kingdom the specimens are mainly of wood. In the New Kingdom both stone and wood were used, and a more artistic form employed.

SARCOPHAGUS.

SARCOPHAGUS.

Sacred texts were placed on papyrus rolls instead of on the coffins, so that the flat sides were no longer needed for this purpose. As a consequence a human shape was given to the coffins, and the deceased was thus represented lying at full length. In the latter dynasties the rectangular shape was again employed, and in Roman times the wooden coffin was customary. Among other peoples the sarcophagus has been more or less employed.

Sard. See CHALCEDONY.

Sardanapa'lus, last king of the Assyrian Empire of Ninus, according to Ctesias. His licentiousness excited a rebellion, headed by Arbaces, satrap of Media, and Belesys, a Chaldean priest. He sustained a siege of two years in Nineveh; and when he could hold out no longer, he placed his treasures and women on a pyre, and perished with them in the flames. Many writers consider this story a myth. Rawlinson thinks that Sardanapalus represents both Asshur-banipal and his successor, Asshur-emit-ilin. Asshur-banipal's title to fame is the library of clay books in the cuneiform character which formed part of his palace treasures at Nineveh. Many thousands of these books are now in the British Museum.

Sar'des. See SARDIS.

Sardine (sär-dēn'), small fish of the herring family, genus *Alosa*. Its flesh is delicate. The fishery employs many men and women on the coasts of Brittany, and to a less extent of Portugal. Sardines are salted, or preserved in olive oil and butter and put up in tin cases. The larger fish are called pilchards in England; their shoals are preyed on by codfish and porpoises. Fish of many other genera of the herring family are called sardines.

Sardin'ia, island of Italy; in the Mediterranean; nearly midway between Spain and Italy; S. of Corsica, from which it is separated by the Strait of Bonifacio, 7½ m. wide; is divided into the provinces of Cagliari and Sassari; area, 9,294 sq. m.; pop. (1906) 824,400. A range of mountains—whose highest peak, Gennargentu, rises 6,233 ft.—traverses the island from N. to S. These mountains are in some places covered with forests or with fine pastures, and contain marble, alabaster, lead, copper, iron, rock crystal, etc. Between the offshoots of the central range lie large table-lands or slightly sloping valleys, with many tracts of fertile soil. Wheat, maize, and beans, wine, olives, figs, and oranges, tobacco, linseed, cotton, hemp, cheese, butter, and wool are raised. Horses are extensively bred, and considerable numbers of cattle, sheep, etc., are kept. The fisheries along the coasts, especially of tunny, anchovies, and sardines, are valuable. Salt is the only manufacture of importance. In 512 B.C. the island was conquered by the Carthaginians, from whom it was wrested by the Romans, 238 B.C. While owing allegiance to the Eastern Empire and the popes, it was overrun by the Goths, Vandals, and Saracens. In 1406 it came into the possession of Aragon, and, after a brief period of Austrian rule, 1720, was given to the house of Savoy.

Sardinia, King'dom of, former kingdom, comprising Savoy, Piedmont, Genoa, and Sardinia, with a total area of 28,769 sq. m., and pop. of over 5,000,000; formed August 24, 1720, by

treaty between Austria and Victor Amadeus II, Duke of Savoy. In 1111 Amadeus III was created Count of Savoy by the Emperor Henry V, and, 1416, Amadeus VIII was created Duke of Savoy by the Emperor Sigismund. In the War of the Spanish Succession (1700–13), Duke Victor Amadeus II (1675–1730) was a claimant for the Spanish throne, and by the Treaty of Peace at Utrecht (1713) he received the island of Sicily and the title of king. Sicily he was compelled to yield to Austria, 1720, but as a compensation he received the island of Sardinia, from which he took his title of King of Sardinia. In 1831 the younger line ascended the throne with Charles Albert (1831–49), who granted a free constitution, 1848. He declared war against Austria, but, March 23, 1849, was defeated at Novara. He resigned the crown to his son, Victor Emmanuel II, who united the scattered Italian nation into one free state. See ITALY.

Sar'dis, or **Sardes,** ancient city of Asia Minor; capital of Lydia; in the plain N. of Mount Tmolus; on the Pactolus River near its junction with the Hermus, about 45 m. E. of Smyrna. There are but few remains of the residence of Crœsus, in whose time Sardis was one of the richest cities in the world. At the side of a steep hill, on which the walls of the acropolis and two enormous columns are still standing, are the ruins of a theater and other buildings. Among other remains is the necropolis of the Lydian kings. The largest of the tumuli is that of Alyattes, circular and about 1,140 ft. in diameter. In the reign of Tiberius, Sardis was destroyed by an earthquake. It was rebuilt, and the Apocalypse mentions the Church of Sardis as one of the seven churches of Asia. The Seljuks captured it in the eleventh century, and, 1402, it was almost entirely destroyed by Tamerlane. A few mud huts constitute the Turkish village of Sart.

Sar'donyx, a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcedony. The name has sometimes been applied to a reddish-yellow or nearly orange variety of chalcedonic quartz resembling carnelian, and also to carnelians whose colors are in alternate bands of red and white.

Sardou (sär-dō'), **Victorien,** 1831–1908; French dramatist; b. Paris; gained his livelihood as a teacher, and by writing for papers, magazines, and cyclopedias; tried his fortune as a dramatist, 1854, with the "Taverne des Étudiants," which failed; tried again, 1860, with "Candide" and "Monsieur Garat," which succeeded; and then wrote a large number of plays, most of which made a great success. He received the decoration of the Legion of Honor, 1863; admitted to the Academy, 1878. His works include "Les Pattes de Mouche," "Nos Intimes," "Bataille d'Amour," "Les Vieux Garçons," "La Famille Benoîton," "Séraphine," "Divorçons," "Odette," "Fedora," "La Tosca," "Thermidor," "Gismonda," "Dante," "L'Affaire des Poisons" (1907).

Sareje'vo (formerly called BOSNA SERAÏ), town on the Miliatzka, near its junction with the Bosna; 122 m. SW. of Belgrade; formerly capital of Bosnia; now of Austro-Hungarian province of Serejevo; is called by the Mussulmans the Damascus of the North; has ironworks and manufactures side arms; is the commercial entrepôt of the province. Pop. (1900) 30,000.

Sargas'so Seas, areas in the N. Atlantic, N. Pacific, and other oceans, having an abundance of the seaweed *Sargassum bacciferum.* The best known is that in the N. Atlantic, which extends from the Azores to the Antilles, and from lat. 16° N. to lat. 38° N., but the sargasso is most abundant W. of lon. 45° W. The seaweed is found in the Gulf Stream and neighboring waters, and is often cast on the shores of the W. Indies and Florida. In the Sargasso Sea it is in streaks, often scores of feet long, or in islands which may cover many acres. It forms a thin superficial layer and offers no resistance to ships. There are twenty to twenty-five plants, on the average, to each square mile. The plant vegetates freely on the Sargasso Sea, but has not been found fructifying there. Its color is greenish olive, varying with age from yellowish to whitish, and bears many berrylike lumps or floats. The Sargasso Sea has remained substantially in the same place and with the same characteristics since Columbus's first voyage.

Sar'gent, John Singer, 1856– ; American portrait and figure painter; b. Florence, Italy, of American parents; pupil of Carolus Duran, Paris; honorable mention, Paris Salon, 1878; second-class medal, Paris Salon, 1881; medal of honor, Paris Exposition, 1889; Legion of Honor, 1889; painted many portraits in Paris, London, New York, and Boston; lived in Paris, 1872–85; then went to London; member of Society of American Artists, associate National Academy, member of the Société Nationale des Beaux-Arts, Paris, and of the Royal Academy. His picture of a Spanish dancer, "La Carmencita," first exhibited in New York City, 1890, was bought by the French Govt., 1892.

Sar'gon, d. 705 B.C.; King of Assyria, 722–705 B.C.; founder of the last and most illustrious Assyrian dynasty, 722–606 B.C.; appears to have been a usurper, though probably of royal stock. Numerous records of his reign, written on clay cylinders, etc., are extant. He waged successful wars with the Chaldeans, Egyptians, Philistines, Hebrews, and many other peoples. In his first year he took Samaria, carried the leading inhabitants of Israel into exile, and put an end to the Kingdom of Israel. But for the monuments, one might suppose (from II Kings, xvii) that this was done by Shalmaneser, his predecessor. In the closing years of his reign he built a new palace near Nineveh, where he was murdered.

Sarma'tia, ancient name for the vast regions extending from the Baltic to the Black Sea, and from the Vistula to the Volga.

Sarmiento (sär-mē-ĕn'tō), **Domingo Faustino,** 1811–88; Argentina statesman; b. San Juan; early engaged in educational work in Chile; sent to Europe and the U. S. by the govern-

ment, 1845, to study the primary-school system; returning to Argentina became Minister of the Interior; later of Education; minister to the U. S., 1864–68; President, Argentina, 1868–74; author of "Lives" of Lincoln and Quiroga, and "Civilization and Barbarism."

Sarpe'don, in Grecian mythology, son of Zeus and Laodamia, grandson of Bellerophon, Prince of Lycia; fought on the side of Troy in the Trojan War, and was slain by Patroclus. His body was carried back to Lycia by the brothers, Sleep and Death, where it was given honorable burial by his kinsmen. The story is told in the "Iliad" of Homer.

Sar'pi, Paolo (commonly known as FRA PAOLO), 1552–1623; Italian historian; b. Venice; spent many years in a Servite convent; appointed Prof. of Theology at Mantua, and afterwards at Venice; and, 1579, became provincial of his order. He studied natural science, and made valuable discoveries in physics. According to Grisellini, Sarpi discovered the circulation of the blood, and was the first to observe the various phenomena of the inclination of the magnetic needle. Pope Paul V, having vainly requested the abrogation of a law of Venice which he deemed contrary to the freedom of the Church, threatened to lay the republic under an interdict. Sarpi was appointed State Canonist, 1605, and, 1606, published a "Trattato dell' interdetto," in which he exhorted the Venetians to disregard the threatened interdict, and a long controversy followed with the papal court. At the same time Sarpi strenuously promoted an alliance between Venice and the new Dutch Republic. He was denounced as a schismatic and a Protestant. He is now best known by his "History of the Council of Trent," often republished and translated.

Sarrace'nia (named in honor of Dr. Sarrasins, of Quebec), genus of N. American herbs of the family *Sarraceniaceæ*, remarkable for the expanded petallike style, and especially for the hollow pitcher-shaped leaves, usually half full of water, and containing many drowned insects. Of the six species *S. purpurea* is the commonest.

Sarsaparil'la, drug consisting of the roots of various species of *Smilax*. Sarsaparilla is collected in W. Mexico, central America, and the N. countries of S. America, and the varieties are known by the names of the countries producing them, or those of the ports of shipment. It was introduced into Spain as early as 1545, and has since been at times a very popular medicine. Those physicians who regard it as of value class it as an alterative, and use it in chronic rheumatism, skin diseases, and in a generally depraved condition of the system. A few years ago immense quantities of quack medicines were sold bearing the name, but containing not a particle of sarsaparilla. The sirup called sarsaparilla, drunk in soda water under the impression that it is healthful, rarely contains any of the drug.

Sars'field, Patrick, Earl of Lucan, abt. 1645–93; Jacobite soldier; b. Ireland; served on the Continent, under the Duke of Monmouth, and against him at Sedgmoor, 1685; was at the revolution a member of the Irish Parliament; adhered to the cause of King James; compelled William III to raise the siege of Limerick, August, 1690; commanded the Irish reserve at the battle of Aughrim, 1691; exhibited great gallantry in the second defense of Limerick; retired to France with a corps of Irish volunteers; distinguished himself at Steenkirke, 1692, and was killed at the battle of Landen.

Sartain', John, 1808–97; American engraver, designer, and literary editor; b. London, England; removed to Philadelphia, 1830; is believed to have introduced mezzotint engraving into America; also practiced oil painting and miniature painting; afterwards he was editor and proprietor of *The Foreign Semimonthly Magazine*, and, having bought *The Union Magazine*, renamed it *Sartain's Union Magazine*. He designed several public monuments, including that to Washington and Lafayette in Monument Cemetery, Philadelphia.

Sarti (sär'tē), **Giuseppe,** 1729–1802; Italian composer; b. Faenza; was imperial chapelmaster and director of the conservatory in St. Petersburg from abt. 1785 till 1801; composed operas (the first produced at Faenza, 1752) and church music, and invented a machine to measure the vibrations of tones.

Sar'to, Andrea Vanucchi del (commonly called ANDREA DEL SARTO), 1487–1530; Italian painter; b. Florence; painted his "Epiphany" and "Birth of the Virgin," 1514. These works lack dignity and grandeur of conception, but his coloring is admirable, his reliefs are singularly bold, and his mastery of chiaroscuro is attested by his illustrations of the life of St. John (1514–26). For Francis I of France he executed the "Pietà," or "Dead Christ," with the Virgin, St. John, and Mary Magdalen. The king invited him to Paris, where he painted his "Charity." In 1525 he painted in the cloisters of the Servites in Florence one of his most celebrated frescoes, the "Madonna del Sacco." His other great works include the "Sacrifice of Abraham," now in Dresden. His copy of Raphael's Leo X, in the museum of Naples, is invariably taken for the original.

Saskatch'ewan, province of Canada, created 1905; former district of the NW. Territories; between lats. 49° N. and 60° N., with Keewatin and Manitoba on the E. and Alberta on the W.; area, 250,650 sq. m.; pop. (1911) 492,432; capital, Regina. The S. portion consists of gently rolling, fertile prairie, well adapted to the production of excellent wheat. The N. is wooded and thickly scattered with lakes. A series of hills follow along the S. bank of the Saskatchewan River, which crosses from W. to E. The greater part of the province, especially the S. portion, is suitable for colonization. The agricultural products include live stock, wheat, barley, oats, peas, and potatoes. There is also a considerable production of pelts, mostly muskrat.

Saskatchewan, river of British N. America. The N. branch, rising on the E. slope of the Rocky Mountains, flows E. and ENE. to its

junction with the S. branch near lon. 105° W. The latter, formed by the Bow and Belly rivers from the Rocky Mountains, flows NE. and ENE. to the junction. The main river flows NE. to the bend (lat. 54°), then SE. to Cedar Lake, and then E. to the NW. extremity of Lake Winnipeg. The area of the basin is 240,000 sq. m. The length of the N. branch to the junction is about 550 m., and that of the main river about 200 m.

Sas'safras, N. American tree of the laurel family (*Lauraceæ*), formerly called *Laurus sassafras*, but now *Sassafras officinale*; rarely exceeds 50 ft. in height, and in N. localities is much smaller; extends from Canada to Louisiana, and is found beyond the Mississippi. Its leaves are aromatic and highly mucilaginous, and the bark of the root is a powerful stimulant, with a pleasant taste and smell. It has considerable use in medicine, but is employed principally for flavoring.

SASSAFRAS.

Sassafras Nuts. See PICHURIM BEANS.

Sa'tan, the chief of the evil spirits in Hebrew and Christian theology. The name occurs three times in the later books of the Old Testament—in Zechariah iii, 1, as opposing the purification of Joshua; in Job i, 6–9, 12; ii, 1–4, 6, as one of the heavenly court and as the tempter of men; and in 1 Chronicles xxi, 1, as leading David astray. But the prophets conceived God as too high to admit any opposing power. But the influence of the dualism of Zoroaster (*q.v.*) developed a belief in a personal malignant spirit. This change may be seen by comparing 1 Chronicles xxi, 1, with 2 Samuel, xxiv, 1. In the Apochrypha there are two mentions of Satan: Sirach xxi, 27, and Wisdom ii, 24. In the Talmud, Satan takes various forms to lead men to evil and death. In the New Testament he stands at the head of the hosts of evil, to sow lies and excite to sin. But over Christ he has no power, and his power wanes over man as man becomes like Christ—without sin. At the end of this æon he will reign for a short time, only to feel again the power of Christ. The early Church softened this apparent dualism by supposing that Satan was a fallen angel, an idea found also in the Talmud. See BEELZEBUB; DEVIL.

Sat'ellite, a small or secondary planet which revolves around another planet. There are twenty-two satellites which revolve about the major planets, the moon being the satellite of the earth. Jupiter has 5, Saturn 9, Mars 2, Uranus 4, and Neptune 1. The fact that when the period and the radius of the orbit of a satellite are known the mass of a primary planet can be determined, is one of the chief points of interest in the study of satellites. For further description, see articles under the individual planets.

Sat'in, a smooth and lustrous fabric of silk, of Chinese invention. Of the warp threads only one in every five or ten is raised to allow the shuttle to be passed, but each thread is raised in regular succession as the shuttle is thrown. It is woven with the right side uppermost.

Satin Spar, a fibrous variety of carbonate of lime, of snowy whiteness, found in England, Scotland, and elsewhere, which when polished has a luster resembling that of satin. A fibrous kind of gypsum, also called satin spar, is softer than the above, and is frequently made into ornaments resembling cat's-eye.

Sat'inwood, a name given to several kinds of ornamental wood. The best is from Guiana, and is the wood of *Ferolia guianensis*. Florida satinwood is from *Xanthoxylum floridanum*, a kind of prickly ash tree. The W. India satinwood is from different trees, some of it of the very best and others of the uneven quality. The rich and fragrant satinwood of India is usually of good quality. It comes from the *Chloroxylon swietenia*, a cedrelaceous tree which yields a sort of wood oil. Satinwood is used in making workboxes, hairbrushes, and cabinet work.

Sat'ire, a literary attack on the weakness and wickedness of humanity. Prose is at its service as well as poetry; it may take the shape of sermon as well as song. It may be dramatic, as in comedy, mask, and mummery. It may be epigrammatic, as in lampoon and pasquinade. It may be indirect, as in parody and travesty. It may be a formal diatribe; it may be an informal skit. The great models of satirical art are found in Roman literature. Whenever satire as literature is mentioned, Horace and Persius and Juvenal come up to the mind. The first appearance of *satura* in Roman literature is in the *saturæ* of Ennius, where it is evidently a medley in verse; the *Saturæ Menippeæ* of Varro are in prose and verse as is the *Satiricon* of Petronius Arbiter.

In the hands of Lucilius the *satura* was an instrument for personal attack on those who had stirred the poet's indignation and was assimilated to that form of the Old Attic comedy which dealt with personal abuse. This resemblance was emphasized by Horace and Persius themselves.

In Juvenal the dramatic element is not marked, and his declamatory rhetoric has had

more influence on modern satire than Horace's *bonhomie*, or the priggish wisdom of Persius. The accepted satire is in heroic verse—in French the alexandrine, in English the decasyllabic. French satire is represented by Boileau, English satire by Dryden and Pope, for Dryden and Pope are the models, not Butler—"Absalom and Achitophel" and the "Dunciad," not "Hudibras." Of course, if the term satire is widened, it will include Lucian and Apuleius, "Reynard the Fox," "Tyll Eulenspiegel" (Howleglas), the "Piers Plowman" of Langland, the "Epistolæ Obscurorum Virorum," and so on, down through moralists, essayists, and novelists of all nationalities and of every century.

Satire Ménippée (să-tēr' mā-nē-pā'), a famous French satire, so called from the Greek Menippus, who used the form of prose interspersed with verse, in which it is composed. It is due to the collaboration of Pierre Le Roy, Jacques Gillot, Nicolas Rapin, Jean Passerat, Florent Chrestien, and Pierre Pithou, and appeared in 1594, after having circulated in manuscript. It was aimed against the league, and reflects the temper of the bourgeoisie, worn out by the civil strife, and putting the peace and unity of their country above party.

Satisfac'tion. See ACCORD AND SATISFACTION.

Satol'li, Francis, 1831–1909; Roman Catholic prelate; b. Perugia, Italy; appointed Prof. of Dogmatic Theology at Urban College of the Propaganda, Rome; archbishop, 1888; president of the Academy of Noble Ecclesiastics; represented the pope at the centenary of the Roman Catholic hierarchy in the U. S., 1889; first apostolic delegate to the U. S., 1893–96.

Satpu'ra Moun'tains, range dividing the Nerbudda and Tapti valleys, British India, extending 600 m. from E. of the Amarkantak plateau nearly to the W. coast. Average height at the crest, 2,000 ft. Highest peak, Dhupgarh, 4,454 ft.

Sa'trap, the ruler of a satrapy or province of ancient Persia. On the decline of the old kingdom some of the satrapies became independent monarchies.

Satsu'ma, former province of Japan, at the S. of Kiushiu; chief town, Kagoshima. Satsuma porcelain owes its origin to Korean settlers, transported at the close of the sixteenth century, and reached its perfection abt. 1840. This ware is of a cream color, and has a crackled surface.

Sat'urday, the seventh and last day of the week. It is the Jewish Sabbath, and the *Dies Sabbati* of the Roman Catholic breviary.

Sat'urn, the Latin god of planting and sowing, and hence of agriculture, the discovery of which was ascribed to him. He was conceived of as a mythical King of Latium, under whose peaceful reign the blessings of agriculture were first disclosed. His memory was cherished by the laboring people and perpetuated in the Saturnalia, the observances of which were suggestive of the reign of plenty and equality. In later Roman mythology he was identified with the Greek Cronos (*q.v.*).

SATURN is also the name given to the sixth planet in order of distance from the sun. It travels at a mean distance of 887,000,000 m. from the sun. Saturn circuits its orbit in 10,759.2198 days, or 29 years 167.2 days. Its volume exceeds the earth's about 700 times, but the mean density is so small that its mass exceeds the earth's only about 93 times. If the density of water be taken as the unit, that of Saturn is about .73, or less than the density of mahogany. Its mean diameter is 70,000 m., the polar diameter is 3,500 m. less, and the equatorial diameter 3,500 m. greater. Saturn is girt by a system of flat rings, the span of which amounts to 167,000 m. There are two chief bright rings, the outermost nearly 10,000 m. in width, the innermost about 17,500 m. in width, while between them there is a gap about 1,500 m. across. Inside the bright rings there is a dark ring, which is 8,700 m. wide. The rings are not continuous bodies, but multitudes of small satellites, mixed with vaporous matter, traveling in flat flights around the central orb.

The globe of Saturn is marked by belts, and its tint as a whole is yellowish, but the belts show a variety of color. As in the case of Jupiter, we are led to the conclusion that we do not see a solid or liquid orb, but only the outer parts of a deep and cloud-laden atmosphere. This interpretation of the rings was further confirmed in 1907 by the discovery of irregular knots which are believed to be due to the irregular crowding of the ring matter.

Saturn has eight visible satellites, which move outside the ring. A ninth, discovered, 1904, on a photographic plate, was too small to be otherwise visible. All but the outer one move in the plane of the ring. The brightest is Titan; the faintest is Hyperion. Hyperion exhibits a peculiarity in its perturbations by Titan, resulting in a revolution of its pericenter, and in a libration between the two bodies. These perturbations form a very interesting chapter in celestial mechanics, which has so far defied the efforts of the best mathematicians to work out a complete and satisfactory solution.

The outer satellite of all is Iapetus, which is much brighter on one side of the planet than on the other, showing that it performs a revolution on its axis in the same time that it revolves around Saturn, and that it is whiter on one side than on the other.

Saturna'lia, the Latin festival of Saturn, celebrated with feasting and mirth. Slaves were permitted freedom of speech and act, and all classes threw off care and toil. During the republic it was celebrated on December 17th; Augustus made it embrace the 17th, 18th, 19th, but popularly it included seven days. The first two were the true Saturnalia, the three following were the Opalia, while the last two were Sigillaria, from the sigilla or clay toys then exchanged as presents. The Christian Christmas festival has retained many traces of the Saturnalia.

Sat'yr Dra'ma, in Greek literature, the fourth play of the tetralogy, which was made

up of a tragic trilogy and this afterpiece. It received its name from the chorus, which was composed of satyrs. The action was taken from mythology and not from every-day life, and the tone was merry. It was, in fact, a tragedy drunk with new wine, and in the Æschylean stage of the trilogy the subject of the satyr drama was so chosen as to burlesque the fundamental theme and thus relieve the tension of the spectators. The only extant specimen of a complete satyr drama is the "Cyclops" of Euripides, translated into English by the poet Shelley.

Sa'tyrs, in Grecian mythology, the companions of Dionysus, demons of the forest, akin to the mountain nymphs and the dancing Kuretes. In their earliest form they were caricatures of the elder Dionysus, and were depicted with long sharp-pointed ears, horse tails, long hair, and pointed beards. They were half animal in form and character, and lustful and sensual. This was supplanted by a less sensual type, created by Praxiteles in his famous statue, the Puck of antiquity. The Satyr must be distinguished from Pan and Silenus, and especially from the Faunus of the Romans.

Saul, first king of Israel, a son of Kish, of the tribe of Benjamin; was anointed by Samuel. Preëminent in appearance and character, his ability as a soldier was shown against the Philistines, Moabites, Ammonites, Edomites, and Amalekites; governed well in the earlier part of his reign, but afterwards was possessed of "an evil spirit from the Lord." He became insanely jealous of David, committed great cruelties, and fell, with three of his sons, in the battles of Mount Gilboa, abt. 1055 B.C.

Sault Sainte Marie (sō sānt mā'rĭ), capital of Chippewa Co., Mich.; on the St. Mary River, near the outlet of Lake Superior, and the ship canal around the rapids. Obstacles to navigation between lakes Superior and Huron by rapids are overcome by locks and power canals on both the Canadian and Michigan sides. The U. S Govt. locks are the largest in the world. The annual tonnage passing through the canal is greater than that of the Suez Canal. Sawmills are the principal local industry. Pop. (1910) 12,615. Also a town on the Canadian side of the river, with large pulp and sawmills, blast furnaces, a steel and charcoal plant, also a considerable trade in furs and fish. Pop. 10,984.

Saumur (sō-mür'), town of France, department of Maine-et-Loire; on the Loire; 30 m. SE. of Angers; is famous for its wine. It was the seat of a Protestant academy founded in 1598, and suppressed, 1685. That academy developed the first fertile criticism in modern theology. Pop. (1907) 16,392.

Saurop'sida, a group of vertebrates containing the reptiles and birds, thus united on account of many structural peculiarities which mark them off from the mammals on the one hand and from the fishlike forms on the other. Though birds and reptiles are seemingly very different, in the Mesozoic age there were many structural resemblances between them.

Sauru'ræ, subclass of birds characterized by a tail of many vertebræ, each vertebra bearing a single feather on either side. The only known member is the *Archæopteryx.*

Saussure (sō-sür'), **Horace Bénédict de,** 1740–99; Swiss physicist and geologist; b. Conches, Switzerland; was appointed Prof. of Physics and Philosophy, Univ. of Geneva, 1762. In 1768 he began a series of scientific mountain excursions, and published valuable observations on minerals, botany, geology, and meteorology.

Sav'age, Richard, 1698–1743; English poet; b. London. He was apprenticed to a shoemaker, but, having displayed literary tastes, he went to London abt. 1716, where he obtained the patronage of Steele. In 1717 he translated from the Spanish a play, "Woman's a Riddle," which had a run of twelve nights; produced in 1723 a successful tragedy, "Sir Thomas Overbury"; in 1726 a volume of "Miscellaneous Poems and Translations"; in 1728, "The Bastard, a Poem," which ran through five editions; and in 1729 his best work, "The Wanderer, a Moral Poem." In 1727 he was condemned to death for killing a man in a tavern brawl, but was pardoned in opposition to the wishes of his alleged mother; subsisted thereafter upon money subscribed by Pope and others; obtained a pension of £50 through some verses he had written on the queen's birthday. He is now best remembered by the pathetic "Life" written by his friend Johnson.

Savan'na, a grassy plain in a tropical region, yielding pasturage in the wet season, and often having a growth of under shrubs. It corresponds to the prairie of N. latitudes. The word is chiefly used in tropical America.

Savannah, capital of Chatham Co., Ga.; on the Savannah River, 18 m. above its mouth. It has an excellent landlocked harbor. The city is built on a bluff 40 ft. above the river.

Its numerous shade trees have earned it the name of the "Forest City." The principal park is Forsyth Park, ten acres, noted for its beautiful fountain. Adjoining it is the Parade Ground, twenty-one acres, in the center of which stands a Confederate monument. Johnson Square contains a monument to Gen. Nathanael Greene, and fronting it is Christ Church, the oldest Protestant-Episcopal edifice in America, which John Wesley founded, and on the site of which he first preached to the colonists, and founded the first Sunday school in America.

Savannah is the seat of a Roman Catholic bishopric, and contains forty-one churches of various denominations.

It is the third largest cotton-shipping port in the U. S., and is the largest naval-stores shipping port in the world. It also exports lumber and rice, and ships fruit and vegetables to the Northern markets. In 1900 its exports of domestic and foreign merchandise aggregated in value $82,383,825 foreign; and its imports of foreign goods, $6,229,817.

Savannah was settled by Gen. Oglethorpe in 1733; repelled a British attack in 1776; captured by the British in 1778; besieged by Americans and French, 1779; and held by Brit-

ish until the close of the Revolution. It received a charter in 1789. In 1796 and 1820 it suffered severely by fire. At the beginning of the Civil War the harbor forts were seized by the state authorities, and thereafter the city was a Confederate post. Sherman invested the city, December, 1864; the Confederates evacuated it and the Union army took possession, December 21st. Pop. (1910) 65,064.

Savannah Riv'er, a boundary stream between Georgia and S. Carolina; it is 450 m. long, and drains an area of 8,000 sq. m. It is navigable to Savannah for vessels drawing 26 ft., and by small vessels to Augusta, 231 m.

Savary (să-vä-rē'), **Anne Jean Marie René,** Duke of Rovigo, 1774–1833; French general; b. Marcq, France; entered the army in 1790; became a colonel after Marengo, and in 1803 general of brigade, and showed his skill as an administrator while head of the secret police; 1804, he presided over the execution of the Duke of Enghien. His greatest military exploit was the victory at Ostrolenka (1807) over the Russians. His greatest diplomatic success was at the Spanish court, 1808, which resulted in Joseph Bonaparte's ascending the throne of Spain. From 1810–14 he was minister of police. After the fall of Napoleon he wished to accompany him to St. Helena, but was kept in captivity at Malta. In 1831 he became commander in chief of Algeria, where he showed great activity.

Save, river of Austria; rises in Carniola, flows through Croatia, forms the boundary between Slavonia and Bosnia, and joins the Danube at Belgrade after a course of 660 m.; navigable for 200 m.

Savigny (să-vēn-yē'), **Friedrich Karl von,** 1779–1861; German jurist; b. Frankfort-on-the-Main. He was appointed professor at Marburg, 1800; at Landshut, 1808; at Berlin, 1810; was made a member of the Court of Cassation in Berlin, 1809; member of the Council of State, 1817; Minister of Justice in 1842. He was the leader of the historical school in jurisprudence, and exercised a great influence on the study of law and on legislation, although his views of the Roman law as the highest standard and most consummate model, and of our time as incapable of developing the idea of right in adequate forms, are considered extravagant.

Sav'in, a berry-bearing evergreen shrub, *Juniperus sabina,* of the *Coniferæ,* growing in Europe and Asia, and also in Canada, but rarely in the U. S. It has a strong, fetid scent, which causes headache. Savin oil and tops are sometimes used by abortionists, but only at the peril of the patient's life. It is sometimes useful in chronic rheumatism, amenorrhea, and other diseases.

Sav'ings Banks, institutions for receiving and securely investing the savings of industry. The first savings bank appears to have been founded at Brunswick, Germany, in 1765. In the latter part of the eighteenth century several banks of this kind were established in Germany and Switzerland. They were introduced to the English public by Bentham in 1797, who proposed a well-devised system of "frugality banks," to constitute a branch of the pauper system of the government. The scheme of Mrs. Priscilla Wakefield, of Tottenham, inaugurated in 1799, embraced the deposit of moneys by women and children only, to whom pensions were to be granted when they reached a certain age. In 1801 the scheme was expanded. An undertaking was organized at Bath in 1808, under the patronage of Lady Isabella Douglas, for the benefit of domestic servants only, which approached more nearly the ideal of savings banks, as subsequently defined and understood, than those previously considered.

The first modern savings bank in Great Britain was organized by the Rev. Henry Duncan, of Ruthwell, Scotland, in 1810. Its success was marked and decisive. The Edinburgh savings bank adopted a more popular procedure than that of Dr. Duncan, and became the model upon which the savings banks were organized thereafter. The character of the legislation affecting savings banks may be outlined as follows: Trustees have at all times been prohibited from deriving any profit from the transactions. The moneys received were to be deposited in the Bank of England or of Ireland to the credit of the commissioners for the reduction of the national debt, and invested in three-per-cent bank annuities. Deposits were limited originally to £100 the first year, and £50 in any year thereafter; this was afterwards changed, and the limit fixed at £30 in any year and £150 in all, or £200 including interest. Depositors were also prohibited from keeping an account in more than one savings bank, but might transfer an account from one bank to another. The significance of these restrictive provisions will be seen in the fact that from 1817 to 1872 the interest paid by the government to savings banks exceeded that which it had received from their investments by £4,169,427 10s. 5d. As an incentive to industry and economy, and a check to pauperism, the government could afford this bounty upon savings banks, but only upon terms that would tend to exclude from it the opulent classes, whom the liberal interest and the security would naturally attract.

In 1861 a system of post-office savings banks was established by which certain post offices throughout the United Kingdom are designated at which sums of not less than one shilling or some multiple thereof will be received for transmission to the central office in London. Not exceeding £30 in one year or £150 in all, or £200 including interest, is received from any one person. In 1909, £49,168,507 was deposited in the post-office savings banks, which then held £164,596,065 due to depositors. The trustees' savings banks in 1909 received £13,749,384, and held deposits aggregating £52,181,983.

Savings Banks in the U. S.—Shortly after the successful inauguration of savings banks in Great Britain, they began to attract attention in the U. S. The first organization of which there is record was in the city of New York, November 29, 1816. The first in practical operation was in Philadelphia, which began to receive deposits December 2, 1816. The first to become incorporated was in Boston, December

13, 1816. Thus the U. S. anticipated Great Britain in giving to this interest the protection of law. The plan of organization of savings banks is not altogether uniform. In some states there is a large body of corporators, who elect from their number annually a board of trustees or directors. In others the corporators are a limited number, who are themselves the trustees and responsible for the management. In the Northeast savings banks are managed by trustees for the depositors; in other parts they are often managed by corporations with capital stock.

In the report of the Controller of the Currency for 1911, 1,884 savings banks reported. The deposits in the savings banks aggregate $4,212,583,598, and the number of depositors 9,597,185.

The following table shows the number of savings banks in the U. S., number of depositors, amount of savings deposits, average amount due each depositor in the years 1820, 1830, 1840, 1850, 1860, 1870, 1880, 1890, 1900, and 1910, and average per capita in the U. S. in the years given.

Year	Number of Banks	Number of Depositors.	Deposits.	Average Due Each Depositor.	Average per Capita in the U. S.
1820	10	8,635	$1,138,578	$131.86	$0.12
1830	36	38,035	6,973,304	183.09	.54
1840	61	78,701	14,051,520	178.54	.82
1850	108	251,354	43,431,130	172.78	1.87
1860	278	693,870	149,277,504	215.13	4.75
1870	517	1,630,846	549,874,358	337.17	14.26
1880	629	2,335,582	819,106,973	350.71	16.33
1890	921	4,258,893	1,524,844,506	358.03	24.35
1900	1,002	6,107,083	2,449,547,885	401.10	31.78
1910	1,759	9,142,908	4,070,486,247	445.20	45.05

By an Act of Congress of June 25, 1910, a postal savings bank system was established in the U. S. Deposits may be made by any person ten years of age and over in sums of not less than one dollar, for not more than $100, in any one month, and to a total amount of not more than $500. The funds received are deposited, under certain restrictions, in local banks, which pay interest at the rate of 2½ per cent. Depositors receive 2 per cent. interest on deposits. They are allowed to exchange at par their deposits for U. S. bonds bearing 2½ per cent interest. Deposits were first received at 48 depositories January 3, 1911. At the close of 1911 there were 5,185 depositories. In October, 1911, 3,148 banks held on deposit $6,440,261.

The original theory of savings banks was that their earnings, after paying expenses, were to be ratably divided among the depositors. But the practice has grown up of paying a given rate of interest. The disasters that have fallen upon savings banks are in nearly every instance traceable to the attempt to fulfill promises concerning interest. In the early history of savings banks, four per cent was a common rate, with occasional extra dividends. During the Civil War, and for many years after, six per cent prevailed. The disasters that followed and the lowering of interest on securities have led to the adoption of the old rate of four per cent, and in some banks as low as three per cent.

The savings-bank system of Canada is largely under government management. The statistics of the post-office and government savings banks of the Dominion for 1911 show 183,359 depositors and deposits of $57,359,225. Besides these, there are private savings banks and ordinary banks with savings-bank functions.

The savings-bank system of France dates from 1818. In 1908 the number of depositors was 7,948,363, and the amount deposited $710,255,608. In the postal savings banks in 1910 there were 5,786,035 depositors, and the amount of deposits, $329,974,970. Savings banks are highly developed in Austria, Italy, Switzerland, Denmark, and some parts of Germany. An unofficial estimate gives the following figures:

Countries.	Number of Depositors.	Amount of Deposits.
Austria	6,300,000	$1,214,000,000
Italy	6,400,000	787,000,000
Germany	20,600,000	3,730,000,000
Scandinavia	3,075,000	357,000,000
Switzerland	1,965,000	307,000,000

See Banks.

Savonaro'la, Girolamo, 1452–98; Italian religious reformer; b. Ferrara, Italy. In 1475 he entered the Dominican Convent in Bologna, where he passed seven years. He was then sent to preach in Florence, but his uncouth manner and harsh voice made his mission at first a failure. He went elsewhere, but in 1490 he returned to Florence, and was successful, and his reputation as a popular preacher rose rapidly. He aimed to make Florence a model Christian commonwealth. His rebukes, hurled alike at the highest and the lowliest wrongdoer, raised a deadly hostility against him. He launched the most scathing denunciations against the corruption then scarcely less conspicuous in the higher ecclesiastics than in the pope Alexander VI. His followers in Florence, known as *Piagnoni* ("weepers," because professed penitents), multiplied; his enemies the *Arrabbiati* (the enraged) grew bitterer. The pope remonstrated, a cardinal's hat was offered, on conditions, but he was not to be moved.

In 1495 he was summoned to Rome, but, knowing what awaited him there, evaded the summons. Finally an order from the Vatican forbade him to preach. He submitted at first, then disobeyed, declaring himself unable to resist the prophetic spirit. Excommunication followed (1497). Savonarola now appealed to the sovereigns of Christendom to call a council to elect a new pope, a course that had been previously pursued by the Council of Constance. On April 7, 1498, occurred the famous attempt at a "trial by fire," to decide whether he was divinely commissioned, but its fiasco turned the people against him. He was arrested and tortured in order to extort a confession. In his agony he gave some confused answer as to his claim of being a divinely appointed prophet,

but no confession of heresy could be obtained from him. He was condemned for heresy, schism, and contempt of the Holy See. His chief offense was his contravention of the Bull Execrabilis of Pius II, which condemns an appeal from the pope to a general council. He was publicly hanged and then burned, and his ashes thrown into the Arno.

Savoy', formerly a political division of the Kingdom of Sardinia. In 1860 it was ceded to France. Savoy is the loftiest mountain region of Europe, containing the highest peak, Mont Blanc. The little arable land it contains is carefully planted with vines and mulberry trees, and also produces wheat. The mountain pastures feed large herds, and dairy farming is the principal occupation. Area, 3,891 sq. m. Pop. (1901) 518,584. The Savoyards are an honest, industrious, intelligent, and hospitable race, deeply attached to their native country.

Savoy Con'ference, a conference between Episcopalians and Presbyterians held in London soon after the Restoration (1661), so called because it met in The Savoy. The implacable attitude of the Episcopalians made agreement impossible, and the conference degenerated into a public rhetorical debate, and ended in hopeless disagreement.

Savoy Declara'tion, an ecclesiastical document, deriving its name from the Savoy Hospital in London, where it was framed by the Congregational elders, September 29, 1658, to declare the principles of their faith and polity. As to doctrine, the Declaration is substantially the same as the Westminster Confession, and it seems to assume that Congregationalism, as to the knowledge of its principles, had attained to something like completeness.

Savoy, The, a spot between the Strand and the Thames Embankment, London, remarkable for its ancient buildings and historical associations. The Savoy Palace was first built by Peter, Count of Savoy, and within it John, King of France, was confined after the battle of Poitiers (1356). In 1381 it was burned during Wat Tyler's insurrection. It was rebuilt by Henry VII. It became a resort for abandoned characters until the reign of Anne, when the buildings began to fall into ruin. In 1811 the walls were swept away, with the exception of the chapel royal built in 1515, which was injured by fire in 1864, but was restored by Queen Victoria.

Saw, a thin plate of metal usually having sharp, angular teeth upon one edge, used for dividing materials by a cutting or abrasive action.

Bronze saws having jeweled teeth were used by the Egyptians for cutting the hardest stones, and a two-handled saw of iron was found at Nimroud. Saws are mentioned in the Bible. Some of the Christian martyrs in apostolic times "were sawn asunder." Cicero speaks of an ingenious saw with which a thief sawed out the bottom of a chest. The saws of the Japanese and other Oriental nations have their teeth so shaped that the saw cuts when

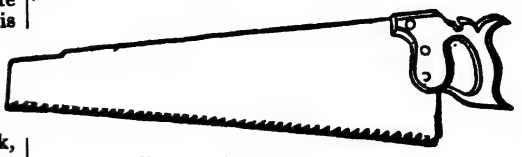


FIG. 1.—ORDINARY HAND SAW.

pulled by the workman, and not when pushed; such saws are superior, as they are not liable to flexure and breakage by the force employed, and can be made much thinner, and require less strength to operate than the saws used in Europe and America.

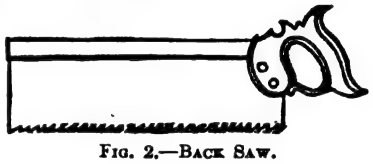


FIG. 2.—BACK SAW.

The uses to which saws are put suggest their classification into rip saws and crosscut saws, according as they are adapted for dividing materials in a direction parallel to their fibers, or for cutting at right angles to the fibers. The varieties of these saws are: reciprocating,

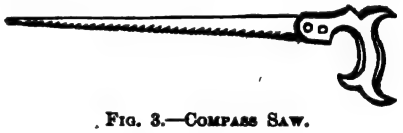


FIG. 3.—COMPASS SAW.

circular, cylinder or drum, and endless band. The reciprocating saw is the oldest, and there are more of this variety used than of all others combined. Circular saws, having jewels for teeth, were known to the ancient Egyptians, and have become indispensable in woodworking establishments. Cylinder or drum

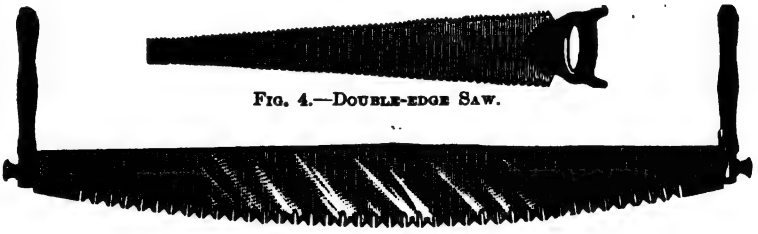


FIG. 4.—DOUBLE-EDGE SAW.

FIG. 5.—DOUBLE-HANDLE CROSS-CUT SAW.

saws are the invention of Hippocrates (b. 460 B.C.), and were first used by him for trepanning the skull. They are used for cutting out button blanks, sheaves for blocks, and curved staves for woodenware. The endless-band saw (or ribbon saw) is an endless ribbon of steel, one edge of which is provided with teeth. The

saw is strained over two large wheels placed one over the other, and is made to move by turning one of these wheels, the wood to be divided being pressed forcibly against the descending portion of the saw.

Saw'fish, one of species of the family *Pristidæ*. The body combines peculiarities of the sharks and rays, being elongated like the former, but with the pectoral fins developed and the branchial apertures inferior, as in the latter; the shagreen is very fine; the snout produced into a very long, flat, daggerlike appendage, which is armed on each edge with a row of strong, compressed, straight teeth. The nostrils are inferior, mouth small and transverse, teeth on the jaws minute, branchial apertures inward from the base of the pectoral fins, spiracles large, behind the eyes; dorsal fins two, unarmed, the first more or less behind the ventrals; pectorals with the front margins free, and not extending on the head. The teeth which are on the margin of the saw are of peculiar development, and must not be confounded with the true teeth of the jaws; the skeleton of the sawlike appendage has from three to five hollow subcylindrical tubes which taper toward the end, and are incrusted with a grainlike osseous deposit. The sawfishes are found in all tropical seas, and one species (*Pristis antiquorum*) occurs on both coasts of the U. S., especially in the more S. waters. An E. Indian species lives in part in fresh water.

Saw'fly, a hymenopterous insect of the family *Tenthredinidæ*. They abound wherever flowers bloom, feeding upon the foliage of the plants.

Saw'mill, the combination of a saw with its actuating machinery, together with the building containing it.

Marble was cut by power saws as early as 360 A.D., and it is not at all improbable that mills for preparing lumber were also in use at that time. The first reliable evidence of sawmills for cutting lumber relates to one at Augsburg, Bavaria, in 1322. On the Danube, near Ratisbon, in 1575, there was a sawmill having "gang saws" by which several boards were cut at the same time. The building of sawmills in England was violently opposed, because it was thought that the hand sawyers would be deprived of their living; one erected in 1653, near London, had to be abandoned, and one erected later, driven by wind, was destroyed by a mob. Probably the first sawmills in America were the three, driven by wind, erected at New Amsterdam (now New York) in 1633. In 1706 the first sawmill in Canada was built on the river Richelieu, near Montreal, by a Mr. Sawyer (who had been made prisoner by the Indians), as the ransom of himself and son. In 1803 there was a steam sawmill in New Orleans run by an engine. This mill was burned by the hand sawyers.

All these mills were of the vertical reciprocating type; their saws were strained in a strong rectangular frame, or gate, to which a vertical reciprocating movement was given by a crank on a revolving shaft, usually placed below it. The log was secured upon a sliding carriage automatically moved a certain distance at each stroke of the saw. In the best mills which had abundant motive power several saws (called a gang), placed the thickness of the intended lumber apart, were strained in the same gate, and the entire log could be cut into boards by a single traverse of the carriage. In the more recent gang-saw mills there are two gates, in one of which there are but two saws, through which the log is first passed and made parallel sided; it is then turned upon one of these sides and passed through the second gate, in which there is a sufficient number of saws to cut the whole log into planks. Circular saws, driven by steam or water power, have been largely used, especially in the U. S., but these are very wasteful. The band saw has been adapted on the Pacific coast for large timber, and is less wasteful and works rapidly.

Saxe, John Godfrey, 1816–87; American poet and humorist; b. Highgate, Vt.; was admitted to the bar, 1843; editor of the Burlington *Sentinel*, 1850–56; State's Attorney of Vermont one year, after which he devoted himself to literature and lecturing. His works include "Progress," "New Rape of the Lock," "The Proud Miss McBride," "The Money King," "Clever Stories of Many Nations," "The Masquerade," and "Leisure Day Rhymes" (1875). More than forty editions of his collected poems have been issued.

Saxe, Marshal, 1696–1750; the name by which Maurice, Count of Saxony, is generally known. He was born at Goslar, a son of Augustus II, Elector of Saxony, and the Countess Aurora von Königsmark. In his twelfth year he was in the army of Prince Eugene. He served against the Turks in 1717, and in 1719 went to France; entered the army, and assiduously studied military science. In 1726 the estates of Courland elected him duke, but, declining the proposed marriage with the duchess, he maintained his ducal authority against her opposition with great difficulty, supporting a small army by means of the money lent him by Adrienne Lecouvreur, the actress. In 1727 he withdrew to Paris. At the outbreak of the Austrian War of Succession he offered his services to his native country, but they were not accepted, and he received a French command. He took Prague by storm in 1741, and fought with great distinction; but his fame he gained chiefly by his campaigns in Flanders, 1744–48, where he won at Fontenoy, 1745, the most brilliant victory of the French over the English. By his victory at Raucoux he conquered the whole of Belgium. Honors were heaped upon him; he was made marshal general of all French camps and armies, and presented with the estates of Chambord, where he led a princely life. His "Rêveries and Mémoires" are full of ingenious and audacious ideas.

Saxe-Al'tenburg, a duchy of the former German Empire; area, 512 sq. m.; pop. (1910) 216,128; revenue and expenditure (1914-16) $1,423,760; public debt (1914) $221,850; is situated NE. of the Thuringian Forest and consists of two separate parts, the E. and W. districts. Capital, Altenburg; pop. (1910) 39,976.

Saxe-Co'burg and Go'tha, two duchies which together formed a constitutional and hereditary monarchy, under the sovereignty of a duke, and an independent member of the former German Empire; area, 755 sq. m.; separated from each other by the Thuringian Forest—Coburg to the S. and Gotha to the N. Pop. (1910) 257,177. Capitals, Coburg and Gotha. Each duchy has a legislative chamber. Agriculture is the principal occupation. The union of the two countries dates from 1826.

Saxe-Wei'mar, one of three main districts into which the former grand duchy of Saxony was divided, the others being Neustadt and Eisenach, all situated along the Rhön and the Thuringian Forest. The city of Weimar became the capital of the republic of Germany 1919.

Saxe-Mei'ningen, a duchy of the former German Empire; area, 953 sq. m.; pop. (1910) 278,762; is situated to the S. of the Thuringian Forest. Capital, Meiningen.

Sax'horn, musical instrument invented, with the saxophone, by Antoine Joseph Adolphe Sax (1814–94), a Belgian instrument maker. They have a rich, flexible tone, and though made of different compass are all fingered alike. Saxhorns are much used in military bands.

Sax'ifrage Fam'ily, *Saxifragaceæ*; a group of about 650 species of herbs and shrubs, comprising the true saxifrages, hydrangeas, gooseberries, currants, grass of Parnassus, mock oranges, etc., many of them ornamental and some useful. The family is moderately represented in the U. S. The true *Saxifragaceæ* are nearly related to the *Rosaceæ*, from which they differ in the definite stamens, endospermous seeds, and in the tendency to consolidation of the carpels, and to possession of opposite leaves without genuine stipules. The early saxifrage (*S. virginiensis*) is a common spring flower in the E. U. S. The swamp saxifrage or meadow plantain (*S. pennsylvanica*) is common in wet grounds in the same region, and its radical leaves are gathered and boiled at pot herbs.

Sax'o Grammat'icus, d. after 1208; Danish historian; b. Denmark. He was probably secretary to Bishop Absalon, from whom he received valuable assistance in his work. His "Gesta Danorum," or "Historia Danica," reaches to 1186. The last six books contain reliable historical material; but his representation of the heathen age, based on Runic inscriptions, old songs, the writings of the Icelanders, etc., is uncritical. His surname he received from the correctness and elegance of his Latin, which excited the admiration even of Erasmus.

Sax'ons, a Low German tribe that dwelt on both sides of the Elbe in its lower course and on the islands near its mouth (*Insulæ Saxonum*). They were first mentioned by Ptolemy in 287 A.D., when they appeared off the coast of Gaul. Their name survives in Saxony and the minor Saxon states. They were early colonists of Normandy and France, where they were soon compelled to give way before the Franks. There are many so-called Saxons in Transylvania, descendants of the Low German colonists introduced, 1143 and 1247, by Hungarian kings. They are one of the dominant races of that region, and use the German language, which, however, is much corrupted. After many years of heroic contest with Charlemagne under Wittikind, their leader, they were forced to accept Christianity and to submit to the Holy Roman Empire. See ANGLO-SAXONS.

Sax'ony, province of Prussia; area, 9,572 sq. m.; pop. (1910) 3,089,275. The W. portions are occupied by the Hartz Mountains. The soil is fertile and well cultivated, and many branches of manufacture are developed. Capital, Magdeburg. Pop. (1910) 279,629.

Saxony, King'dom of, in area the fifth and in population the third state of the former German Empire; between Prussia and Austria, a position fraught with policial difficulties, and the cause of most of its political vicissitudes. Its area is 5,787 sq. m.; pop. (1910) 4,806,661, mostly Lutherans, but including 233,872 Catholics and 17,587 Jews. The population is dense—830.6 per sq. m. The surface is mostly mountainous and hilly, with one fifth of lowland. The principal river is the Elbe, with its affluents. Agriculture, forestry, and mining are highly developed. The principal center of commerce is Leipsis. Saxony is better provided with railways than any other part of the late empire. Government, a constitutional monarchy, established in 1831. After 1871 Saxony was a part of the German Empire, and in all foreign affairs and many important interior matters the imperial authority had wholly superseded that of the Saxon Govt. The army formed the Twelfth Corps of the German imperial army. The Saxon colors are green and silver. After the capital, Dresden, pop. (1910) 551,697, the more important towns are Chemnitz, Leipzig, Zwickau, Plauen, Zittau, and Bautzen. Upon the division of the empire of Charlemagne, Saxony became a part of Austrasia under Otto the Magnificent. Many dynastic and territorial changes followed. The Elector Augustus embraced Catholicism in 1697, became King of Poland, and involved Saxony in war with Charles XII of Sweden. His successor, Augustus, sided with Maria Theresa of Austria against Frederick of Prussia, and in the Seven Years' War Saxony suffered heavy losses. Under Frederick Augustus III (1763–1827) the country again began to rise. As a member of the German Empire it took part in the war against France, was an ally of Prussia in 1806, but after the defeat at Jena, Saxony entered the Confederation of the Rhine, after which the elector received the title of king. By the Peace of Tilsit the King of Saxony enlarged his dominions, but after the battle of Leipzig he was taken prisoner, and at the Congress of Vienna (1815) was deprived of 7,720 sq. m. of territory. Thence to 1866 the country became prosperous. In 1854 King John, with his minister, Beust, opposed the Prussian policy, and showed a partiality for Austria. The war of 1866 brought the independence of Saxony in danger, and John saved his crown only by dismissing Beust, entering the N. German Confederacy, and paying 30,000,000 marks in war indemnity. In 1870–71 the Saxons fought by the side of the Prussians, and since then the

development of the country has not only kept pace with that of the rest of N. Germany, but in some respects even advanced beyond it.

Sax'ophone, a class of musical instruments invented by A. Sax (see SAXHORN). It is a conical brass tube, with a mouthpiece furnished with a simple reed like a clarionet. Saxophones are made of various compass, but the fingering is alike on all. They are effective in brass bands, but not used in orchestras.

Sax'ton, Joseph, 1799–1873; American inventor; b. Huntingdon, Pa.; at eighteen, in Philadelphia, invented a machine for cutting the teeth of chronometer wheels, and made the clock for the tower of Independence Hall. In London, 1828–37, he made a machine by which the first magnetic spark was produced, and constructed the apparatus used by Wheatstone in determining the velocity of electricity, and devised a differential pulley. Upon his return to the U. S. he superintended and established the standard weights and measures for the Philadelphia mint. Among his other inventions were a deep-sea thermometer, a tide gauge, and a hydrometer. He was an incorporator of the National Academy of Sciences.

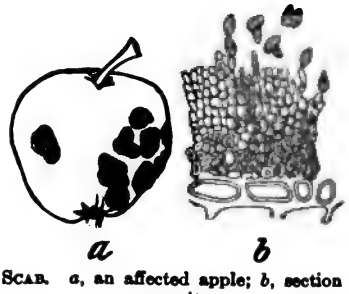
Say, Jean Baptiste, 1767–1832; French economist; b. Lyons; was employed on Mirabeau's paper, *Courrier de Provence,* and edited from 1794 to 1800 *La Décade*; member of the tribunate, 1799; published his "Traité d'Économie Politique" in 1803, and enjoyed a great reputation when his disagreement with Napoleon's policy compelled him to retire into private life. After the fall of Napoleon he again took an active part in public life. He was the first writer to popularize the doctrines of Adam Smith on the Continent.

Say, Jean Baptiste Léon, 1826–96; French economist; b. Paris; grandson of Jean B. Say; was prefect of the department of the Seine, 1871; member of the Legislative Assembly; Minister of Finance, 1872, 1875, and 1877; president of the International Monetary Conference at Paris in 1878; Minister to Great Britain, 1880, and in the same year president of the Senate. Author of "Théorie des Changes Étrangers; Histoire de la Caisse d'Escompte."

Sayce, Archibald Henry, 1846– ; English philologist; b. Shirehampton; was appointed Deputy Prof. of Comparative Philology, Oxford, 1876, which office he resigned in 1890. He has worked in a great variety of fields—classic, biblical, Assyrian, Hittite, Vannic, Egyptian. Among his many publications are "Introduction to the Science of Language," "The Ancient Empires of the East," "The Hibbert Lectures for 1887" (on the religion of the ancient Babylonians), "The Records of the Past," "The Archæology of Cuneiform Inscriptions."

Scab, a disease of sheep resembling the itch; is caused by a minute acarus or mite. Sulphur ointment, arsenical washes, and mercurial ointments will generally cure it. It may be suspected when the sheep rub themselves much or have scurfy patches upon the skin.

SCAB (in plants), the popular name of several diseases, characterized by a roughening of the surface of the affected part. *Apple scab* is a disease in which the fruit becomes covered with black scablike spots, caused by a minute fungus. The loss in some states from the apple scab amounts to one half the crop. Spraying in the spring with iron or copper sulphate is beneficial. *Pear scab* is a similar affection of the pear, caused by a similar fungus. *Grape scab,* or anthracnose, occurs upon the leaves, twigs, and berries, forming brownish or grayish scabs with darker margins. It is one of the most destructive of the grape diseases. *Potato scab* is a disease of the tubers in which the surface becomes covered with warty scabs. The tuber develops masses of cells to close the wounds resulting from the action of the bacteria. *Beet scab* is a disease of sugar beets similar to the potato scab; in growing sugar beets, fields in which scabby potatoes have been grown should be avoided. *Wheat scab* is a disease of the heads of wheat in which they turn pale yellow, the kernels shriveling and drying up. The chaff also becomes coated over with a sticky growth of fungus. Early sowing upon well-prepared soil tends to decrease this disease.



APPLE SCAB. *a*, an affected apple; *b*, section showing parasite.

Scab'bard Fish, the *Lepidopus argyreus,* a species of the family *Trichiuridæ,* so called because its shape bears some resemblance to the sheath of a sword, distinguished by the long, ribbonlike body, pointed head, formidably armed mouth, and well-developed fins. The species is an open-sea fish, and rather rare on the coasts of Europe.

Sca'bies, or **Itch,** an inflammation of the skin caused by the burrowing of the itch insect *Acarus scabiei* and the scratching of the sufferers. It affects usually the hands, but may appear on other parts, the burrows looking like old pin scratches. The insect is transmitted by contact, especially among children at school. The treatment is to kill the parasites by sulphur, and then apply soothing ointments in various forms to the irritated skin.

Scad, or **Horse Mack'erel,** the *Trachurus,* a fish of the family *Carangidæ,* distinguished by its long, spindle-shaped body, completely plated lateral line, and silvery color. When fresh it is scarcely edible, but it takes salt well, and when pickled is good. Many are taken in the British seas. The name has been extended to other similar species.

Scævola (sĕv'ō-lă), cognomen of a Roman family of the Mucii; the most prominent members follow: CAIUS MUCIUS SCÆVOLA, when King Porsena besieged Rome, sought to kill him, but stabbed another by mistake. Porsena ordered Mucius to be burned alive, whereupon he thrust his right hand in the fire without flinching, and told the king that 2,300 Roman youths had sworn to kill him. Porsena, in alarm, made peace and retired. Mucius was thereafter called Scævola, or "left-handed," from the loss of his right hand. QUINTUS MUCIUS SCÆVOLA, THE AUGUR, was tribune in 128 B.C., prætor 121, consul 117, and died during the war between Marius and Sulla. Cicero was taken by his father to Scævola to be instructed in law. QUINTUS MUCIUS SCÆVOLA, THE PONTIFEX, was tribune in 106 B.C., and consul in 95. He was proscribed and put to death by the party of Marius in 82. Cicero writes that of jurisconsults he was the most eloquent, and of orators the most deeply versed in the law.

Scaglio'la, an imitation of marble, granite, or other ornamental stone, made by mixing ground gypsum with glue, coloring it, and setting into the soft mass bits of ornamental stones. When hard it is polished. It is an admirable imitation, but is not durable, especially in damp places.

Sca'la, an Italian family which reigned in Verona, 1260 to 1387. After a long series of internal disturbances, Mastino della Scala, in 1260, made himself master of the city. He ruled with firmness and wisdom; the city prospered and the power continued in his family for a century. Under Cangrande (1311–29) the fortune of the family culminated. He was confirmed in his possessions, to which were added Vicenza, Padua, Treviso, etc., by the Emperor Henry VII. At his court lived Dante, and many of the magnificent edifices of the city were erected during his reign. Most of his successors were worthless tyrants, and in 1387 Galeazzo Visconti of Milan expelled Antonio della Scala. The male line became extinct in 1598.

Scald. See BURNS AND SCALDS.

Scald Head. See FAVUS.

Scalds, or **Skalds,** the poets and historians of the Scandinavian race. They sang the praises of the gods, and celebrated the exploits of the national heroes. A list of 230 of the most distinguished is still preserved in the Icelandic language.

Scale, an instrument used in applied geometry. It consists of a slip of wood or other material divided into parts in accordance with some mathematical law. The common ruler has a variety of scales stamped on its faces, of which the *scale of equal parts* and the *scale of chords* are most common.

The *scale of equal parts* consists of a number of inches, or parts of an inch, laid off along a line. The representative fraction gives the ratio between the scale and the object it represents. Thus if the scale is of 1 in. to 8 m., the fraction is 1:506,880. The first part, counting from the left, is subdivided into ten equal parts, the 0 of the scale being at the beginning of the second part. The *principal divisions* are numbered from the 0 toward the right, and the *subdivisions* toward the left. This scale is used, in connection with a pair of dividers, for measuring the lines of a drawing. The diagonal scale is to divide the subdivisions.

The scale of chords is used for determining the angles of a drawing. It is made by laying off from the left-hand extremity of a line the chords of all the arcs from 0° to 90°, corresponding to some assumed radius. The extremity of each chord is properly marked. To lay off an angle, the vertex and one side being given, take the chord of 60° as a radius, and from the vertex of the angle as a center describe an arc cutting the given side; then from the point in which this arc cuts the side as a center, with a radius equal to the chord of the arc corresponding to the given angle, describe a second arc cutting the first; join this point of intersection with the given vertex; the last line will make the required angle with the given side.

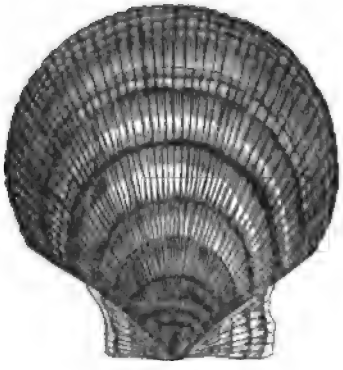
SCALE, in music, the series of sounds which form the gamut. The scale in its simplest form consists of seven degrees, counted upward from a prime, to which series the eighth is added to complete the octave. By reverse motion the descending scale is formed. The *diatonic* scale consists of the tones and semitones of the octave in their natural order and relation, as A, B, C, D, E, F, G, A. In modern music only two diatonic scales are used, the *major* and the *minor*. The characteristic interval in both these scales is the *third*, which is one semitone greater in the major than in the minor. In ancient music other diatonic scales were in use. Scale means also the range of sounds producible by any instrument, as the scale of the violin or piano. It is also technically applied to the size of pipes or strings of musical instruments. See GAMUT.

Scale In'sects. See COCCUS.

Scal'iger, Joseph Justus, 1540–1609; French classical scholar; b. Agen, Guyenne. He was carefully educated by his father, and studied in Bordeaux and Paris (under Turnebus, 1565), and was professor in Geneva, 1572–74. The succeeding twenty years were spent in travel and on the estates of his patron, de la Rochepozay. In 1593 he accepted a call to the Univ. of Leyden, where he remained till his death. Scaliger has been styled the "most richly stored intellect that ever spent itself in acquiring knowledge." He mastered thirteen languages, and his acquirements in mathematics and the sciences were profound, and his acquaintance with classical antiquity all embracing. He was the founder of epigraphy, numismatics, and chronology as sciences. There is scarcely an ancient author whose text has not been benefited by Scaliger's genius. His restoration of the lost portions of the "Chronicon" of Eusebius was perhaps the greatest triumph of conjectural skill on record, for when the missing parts were discovered in an Armenian translation they were found to coin-

cide with Scaliger's reconstruction. His father, JULIUS CÆSAR SCALIGER (1484–1558), was also a man of great learning, but irritable. His attack on Erasmus was marked by the most virulent invective.

Scal'lop, molluscs of the family *Pectinidæ*. The shell is circular, the straight hinge having earlike lobes at either end. Many species are used for food, especially the *Pecten irradians*,



SCALLOP.

which abounds on the shores S. of Cape Cod. Only the muscle which closes the shell is used for food. A scallop shell was worn by pilgrims to show that they had been to the Holy Land.

Scalp, the outer covering of the top of the human head, consisting of the hairy integument, the tendon of the occipito-frontal muscle, and subcutaneous tissue. Wounds of the scalp are treated antiseptically, as they are liable to lead to erysipelas. The removal of the scalp of a dead (or even a living) enemy as a token of triumph is one of the customs of many tribes of N. American Indians.

Scaman'der, a stream in the plain of Troy. According to Homer, it arose from two sources, one of hot and the other of cold water. The river is called Mendere-Su by the Turks.

Scam'mony, a cathartic drug obtained from the *Convolvulus scammonia*, a twining plant. The root contains a milky juice which constitutes the drug. The active principle is a resin which may be used instead of the crude drug. Scammony is a powerful cathartic, and in overdose is capable of exciting dangerous inflammation.

Scan'derbeg (Turkish, ISKANDER BEY), 1404–68; Albanian soldier and patriot. His real name was GEORGE CASTRIOTES. He gained distinction in the Ottoman campaigns in Asia, but when his father, the despot of N. Albania, died, 1432, the sultan incorporated Albania as a province. Scanderbeg was indignant, but bided his time. In 1443 he was sent with a large army into Hungary. He so maneuvered as to give the victory to the Hungarian Huniadi, and fled with a few followers to Croia. By a ruse he obtained possession of the chief Albanian fortress. Abjuring Islam, he called upon the Albanians to revolt. During seventeen years Scanderbeg resisted the power of the Ottoman Empire, fifteen times defeating armies more numerous than his own. In 1461 the sultan acknowledged the independence of Albania and Epirus. Persuaded by the pope to violate the treaty and attack the Ottomans, Scanderbeg won eight victories, the last, with 24,000 men, over Mohammed II, who had 100,000. Despite his ferocity and lack of faith, Scanderbeg is deservedly honored as the "hero of Albania."

Scandina'via, the peninsula bounded by the Baltic Sea, Gulf of Bothnia, the North Sea, and Atlantic Ocean. It includes Norway, Sweden, and part of Finland. In an ethnographic sense, it includes Denmark.

Scandina'vian Lan'guages, the Teutonic languages of the Scandinavian N., inclusive of Iceland, the Faeroës, and Greenland. With Gothic and W. Germanic Scandinavian forms the Teutonic branch of the Indo-European family of languages. In its historical development Scandinavian falls into several periods. Common Norse extends from the earliest time to the Viking age in 700. It is the homogeneous parent language of the N. The second period is the Viking age, from 700 to 1050. Three dialects appear—Old Norwegian, Old Danish, and Old Swedish, including the dialect of Gotland, Old Gutnic, to which was added in the ninth century a fourth, Old Icelandic. At the end of the Viking age these dialects again had differentiated into languages whose early or "old" period extends to about 1530, at which time the modern period begins.

Scandinavian Mythol'ogy, often called NORSE or NORTHERN, but more properly TEUTONIC since its deities were worshiped in Germany and England as well as in Iceland, Norway, Sweden, and Denmark. Our knowledge of it is gleaned from runic inscriptions, ancient laws and glossaries, and formulas by which converts to Christianity renounced the old gods. Richer veins of information are such old poems as the Nibelungenlied and the Anglo-Saxon Beowulf. Cæsar and Tacitus rank also as sources of information. Saxo-Grammaticus gives an euhemeristic outline of the mythology, *i.e.*, the deities are presented as kings of early time. The Icelandic Eddas are, however, the chief sources. The euhemeristic interpretation of Teutonic myths was superseded by the physical interpretation making the deities represent the powers of nature. Later it was sought to read into the myths a deeper, philosophic, and moral meaning.

The Scandinavian myths are inferior to the Greek in beauty, but they outrank them in deep significance and wealth of thought. The Greek gods live a happy life, free from care. The life of the old vikings was characterized by struggle and warfare, and so their gods too are engaged in an unending conflict with the powers of evil which they never wholly overcome. A peculiar feature of the Asa faith is the idea that the present world must perish and give place to a new and better one. The gods know that they cannot escape destruction, but they seek to ward off that catastro-

phe as long as possible. In the regenerated world gods and virtuous men shall enjoy eternal happiness. The myths form a drama, in which every detail leads up to Ragnarok, the twilight of the gods, which constitutes the final act.

Ymer the giant and the great cow Audhumbla (chaos) were the first of created things. Bure, the first man, begat Bor, whose sons, Odin (spirit), Vili (will), and Ve (holiness), slew Ymer and from his dead body created the present world. They built a wall, Midgard, to protect men from the giant descendants of Ymer, who dwelt in Jotunheim. Above Midgard was Asgard, the home of the asas or gods. Dwarfs, elves, and men were created by the gods and owed them service. The giants and the dwellers of the nether world (Helheim and Niflheim) were the enemies of gods and men. Odin created the first human pair, Ask and Embla, from an ash and an elm tree. After the creation there was a golden age, till the norns (fates), Urd (past), Verhandi (present), and Skuld (future), came from Jotunheim. Time and even the gods were subject to their decrees. With the norns came a ceaseless strife between the good and the evil powers, neither gaining a decisive victory. The world ash tree Ygdrasil symbolizes the universe. On it Odin hung nine nights and sacrificed himself unto himself. Odin is the Alfather, active everywhere to ward off the doom of Ragnarok. He sends his maidservants, the Valkyries, to bring to Valhalla all warriors who have died in battle.

Other prominent gods are: Brage, the god of song and eloquence; Njord, the sea god; Frey, the sun god; Heimdal, who represents eternal vigilance; Thor (Thursday is named after him) is the god of thunder. Balder is the type of moral purity, wisdom, peace, and good will. While he lived the asas were secure, but when he was slain at the instigation of Loki, the fall of creation could not be prevented. Loki is the personification of evil. He is put in chains after the slaying of Balder, but escapes, and in Ragnarok leads the hosts of Hel. There are twenty-six goddesses, the chief being Frigg, the wife of Odin. Freya (Friday is named after her) is the Norse Venus. Next to the gods are the countless giants. The brood of Loki, himself a giant, were the Fenriswolf, the Midgard serpent which, cast into the sea, encircles the earth, and Hel, the giantess of death. The giants were older than the gods and surpassed them in knowledge. The wisest is Mimer, the richest Ægir, the giant of the sea. See MYTHOLOGY.

Scape'goat, in Jewish ritual, a goat which on the Day of Atonement was brought to the door of the tabernacle, where the high priest laid his hands upon him, confessing the sins of the people and putting them on the head of the goat, after which the goat was sent into the wilderness (or, in later years, thrown over a precipice), bearing the iniquities of the people (Lev. xvi).

Scap'ular, (1) a garment worn by various Roman Catholic orders. It is a long piece of serge, one end of which falls in front and behind the wearer. (2) A small concealed emblem worn by Catholics, who bind themselves to a certain round of religious exercises called the Devotion of the Scapular. There are several scapulars, as that of the Passion and that of the Seven Sorrows of Mary, but the original one, that of Our Lady of Mt. Carmel, was, it is claimed, revealed by the Virgin to the Blessed Simon Stock, an English Carmelite who died 1265.

Scar'ab, or **Scarabæ'us,** a black or metallic-colored dung beetle found in the tropics, particularly in Egypt, where it was the symbol of the god Kheper and the emblem of the revivification of the body and the immortality of the soul. The daily revolution and reappearance of the sun typified the return of the

SCARAB.

soul to life. The beetle places its eggs in a mass of ox dung, which it rolls into a ball. The ball is propelled by the beetle with its hind legs. It was believed that the female did not exist, and hence, as procreated by the male only, the scarab was a symbol of the self-begetting and of the immortal, while in later hermetic literature it was the type of the "only begotten," of "generation," of "father," of "man," and of the "world."

The Egyptian figures of the scarab were made of various metals or stones and inscribed with religious or historical texts, with names of gods, kings, and other persons, and with magical legends and devices. Funereal scarabs were placed on the fingers or over the heart of the dead. Ornamental scarabs were employed as charms. They were strung as necklaces, or used singly as rings. Historical scarabs comprise all those bearing royal names or historical texts or data. The number of the former is great, and nearly every king from Menes to Antoninus is represented. The Phœnicians and others borrowed the design and produced objects which are usually called scaraboids. The making of forged scarabs is now pursued to a large extent in Egypt.

Scar'borough, town in York, England; 43 m. NE. of York. It rises like an amphitheater from a sandy bay. It has been called the "queen of watering places." There are manufactures of jet and much fishing trade. Pop. (1901) 38,161.

Scarlat'ti, Alessandro, 1659–1725; Italian composer; b. Trapani, Sicily; composed 115 operas, and thousands of other pieces. He was the originator of the overture, and the first composer who gave to orchestral accompaniment an air of separate design. His son,

DOMENICO SCARLATTI (1683–1757) was the greatest pianist of his time.

Scar'let Fe'ver, or **Scarlati'na,** an infectious disease characterized by a red skin eruption and a sore and swollen throat. It usually attacks children under ten but many never have it. The poison is probably spread by the secretions of the nose and throat and from the scaling of the skin. The germ is very resistant, and clothing, etc., holds infection for a long time. Scarlet fever and a disease much resembling it may be communicated by milk. A germ similar to the malarial parasite has been observed in the skin, but not yet satisfactorily identified as the cause of scarlet fever.

After an incubation of a week, its onset is sudden, with vomiting and sometimes convulsions; the fever rises rapidly to 103° or 105°; the tongue is coated with a white fur, and the pulse runs to 120 or 140. On the second day scattered red points appear on the neck and chest and spread with a red rash, but this fades in two or three days. In a week peeling begins, and even the hair and nails may be shed. The principal complications of scarlet fever are: kidney trouble, rheumatism which may involve the heart, deafness, and nervous disorders. The patient should be isolated at an even and well-ventilated temperature, and fed on milk, broths, and fresh fruits with plenty of water. Sponging and even the cold pack will reduce the fever. Cold must be avoided during convalescence. The throat should be sprayed with boric-acid solution. The patient should not be released until peeling is complete, *i.e.*, for six weeks at least. In simple scarlet fever the symptoms are all mild; in the septic type the effects upon the throat may be very severe; while malignant scarlet fever may kill within twenty-four hours.

Scarlet Tan'ager. See TANAGERS.

Scarron', Paul, 1610–60; French writer of burlesque; b. Paris; was destined for the Church, but spent his youth in dissipation, till overtaken by paralysis. He then took up literature, and developed a brilliant talent for burlesque. His "L'Énéide Travestie," "Mazarinade," and especially his "Roman Comique," (translated by Goldsmith), became literary types, and are still read. In 1652 he married Françoise d'Aubigné, afterwards Mme. de Maintenon.

Scha'dow, Rudolph (called also ZENO RIDOLFO), 1786–1822; Italian sculptor; b. Rome; was the oldest son of Johann G. Schadow. He studied with Thorwaldsen and Canova, and became famous at an early age. He was much employed, and perhaps too constant application caused his early death, at Rome. Among his works are the bas-reliefs of the Daughters of Leucippe, Socrates, and Theodata, and that of the tomb of the Marquis of Lansdowne; the statues of St. John the Baptist, Diana, and a Bacchus; a group of the Virgin and Child; and his last work, Achilles Defending the Body of Penthesilea.

Schaff (shäf), **Philip,** 1819–93; American theologian; b. Coire, Switzerland. Studied at Tübingen and Berlin; 1843, professor in Theological Seminary German Reformed Church of the U. S. at Mercersburg, Pa.; Prof. of Sacred Literature, Union Theological Seminary, New York, 1870–87; then Prof. of Church History. He was a founder of the American branch of the Evangelical Alliance; took part in founding the Presbyterian Alliance in London, 1875, and was president of the American Bible Revision Committee. His many writings include a "History of the Apostolic Church," "History of the Christian Church," "Creeds of Christendom."

Schaffhausen (shäf-how'zĕn), canton of Switzerland; bounded N. by Baden and S. by the Rhine. Area, 114 sq. m.; pop. (1905) 42,939. It consists of fertile valleys which slope toward the Rhine. Schaffhausen, the capital, on the Rhine, has manufactures of iron and silk. Pop. (1900) 15,403.

Schamyl (shăm'ĭl), 1797–1871; warrior and prophet of the tribes of the Caucasus. From 1824 to 1831 he took part in the holy war against Russia. A sufi, he claimed to be the elect envoy of God. Twice coming to life when apparently dead, astute and sincere, he made the Circassians recognize his pretensions; during twenty-two years he was their leader against Russia. In 1859 he was captured and carried to Russia. A marvelously handsome man, daring, eloquent, always master of himself, an economical and judicious administrator, he maintained an absolute supremacy over his lawless followers, who feared him as a wizard and revered him as a saint.

Scharn'horst, Gerhard Johann David von, 1756–1813; Prussian military officer; b. Bordenau, Hanover; 1801, became director of the military academy, Berlin; after 1807 he took charge of the whole administration of military affairs till 1810, when Napoleon requested his retirement. It was chiefly through his energy and ideas that Prussia in 1813 was able to place an effective army in the field.

Scheele (shā'lĕ), **Karl Wilhelm,** 1742–86; Swedish chemist; settled in 1777 as apothecary at Köping, near Stockholm, where he died. He discovered tartaric acid, manganese, chlorine, baryta, glycerin, the pigment called Scheele's green, and the coloring matter of Prussian blue, and described oxygen, unaware of its previous discovery by Priestley.

Scheele's (shēlz) **Green,** or **Swe'dish Green,** arsenite of copper; prepared from arsenious oxide and blue vitriol, and is a yellowish-green powder. Scheele's green is little used in the U. S., being replaced by the more brilliant Schweinfurth green.

Schef'fel, Joseph Viktor von, 1826–86; German poet and novelist; b. Karlsruhe; studied and practiced law for several years. In 1854 he published his "Trompeter von Säckingen," an epic poem of great poetic charm, and in 1858 his great historical novel, "Ekkehard," a story of the tenth century. Scheffel's artistic description of German life of the past, his delightful humor and true patriotic feeling, led to his being imitated by a host of followers. He became equally popular as a lyric poet, es-

pecially by his "Gaudeamus" (1868), a collection of lyrics of quaint and exquisite humor, many of which became favorite student songs.

Scheffer, Ary, 1797–1858; French painter; b. Dordrecht, Holland. He was not in sympathy with either the academic or classic style of painting taught by his master, nor with that of the new school of romanticists led by Delacroix and Géricault, and he formed a style of his own, more sentimental than vigorous and healthy. One of his most noted pictures, "The Suliote Woman" (1827), is in the Louvre.

Scheldt (skĕlt), the most important river of Belgium. It rises in the department of Aisne, France, and enters Belgium near Tournay; flows past Tournay, past Ghent and Antwerp. At the latter point it becomes a noble stream. As it approaches the North Sea, the islands of N. and S. Beveland divide it into the W. and E. Scheldt. Its length is 210 m.

Schelling (shĕl'lĭng), **Friedrich Wilhelm Joseph von,** 1775–1854; b. near Stuttgart. Studied at Tübingen and Leipzig; professor at Jena, 1798; at Würzburg, 1803; secretary of the Academy of Arts at Munich, 1808–41; Hegel's successor at the Univ. of Berlin, 1841. Following Fichte and Hegel, the ultimate principle of Schelling's early system was the union of the ideal with the real, of mind with matter. In æsthetic art this union was to be found, and the Beautiful is the highest realization of the Absolute. Later Schelling modified his system by substituting religion for art as the highest activity. Schelling laid great stress on the distinction between Pauline and Johannean Christianity, which he divided into three periods: Petrine, or Catholicism; Pauline, or Protestantism; Johannean, or the Church of the future.

Schenck (skĕnk), **Robert Cumming,** 1809–90; American diplomat; b. Franklin, Ohio; admitted to the bar; member of Congress, 1843–51; U. S. minister to Brazil, and employed on diplomatic missions in S. America, 1851–54; appointed brigadier general, 1861. At the second battle of Bull Run he was severely wounded, and promoted to be major general in command of the Eighth Army Corps and Middle Department. Resigned, December, 1863, and resumed his seat in Congress, till 1871; appointed minister to Great Britain, 1871–76.

Schenectady (skĕ-nĕk'tă-dĕ), capital Schenectady Co., N. Y.; 17 m. W. of Albany, on the Mohawk River, and in one of the most beautiful portions of its valley; is the seat of Union College. The manufacturing industries are numerous, with large electrical and machine shops. Schenectady is one of the oldest cities in the state. It was settled by Arent Van Curler in 1661, patented in 1684, burned by the French and Indians, who massacred all but sixty of its inhabitants, in 1690; incorporated, 1798. Pop. (1910) 72,826.

Schiaparelli (skē-ä-pä-rĕl'lē), **Giovanni Virginio,** 1835–1910; Italian astronomer; b. Piedmont; director of the observatory at Milan, 1862, and is best known for his discovery of the relation between comets and meteors. His observations on Mars are of note, as well as his conclusion that Venus and Mars, in their rotation around the sun, always present the same face to it as the moon does to the earth.

Schiedam (schē-dăm'), town of the Netherlands, province of S. Holland; on the Schie, 2½ m. W. of Rotterdam. Principal industry is gin, and large herds are fed from the refuse of the distilleries. Pop. (1907) 30,000.

Schiller, Johann Christoph Friedrich von, 1759–1805; b. Marbach, Würtemberg; 1780, he became a surgeon in the army. In 1781 his play, "The Robbers," produced a universal impression, as the time was ripe for a revolt against French classicism. The Duke of Würtemberg, fearing the effect of the work, which idealized brigandage, ordered the author to adhere to his profession. Schiller nevertheless remodeled the play, was arrested, escaped, and for a year remained in concealment. He then held the position of dramatic poet to the theater at Mannheim, and remained there till 1785, when he went to Leipzig, and then to Dresden, where he stayed till 1787, and wrote the tragedy "Don Carlos," the sketch "The Revolt of the Netherlands," and many lyrical poems. In 1787 he went to Weimar, where he met Charlotte von Lengefeld (who became his wife in 1790), Herder, Wieland, and Goethe. The meeting with Goethe has a special interest from the fact that these poets, destined to be such friends, disliked each other at first sight.

In 1789 he became Prof. of History at Jena, and in 1791 finished his "History of the Thirty Years' War," according to Carlyle "the best historical performance which Germany could boast of." Goethe coöperated with him in a literary periodical called *The Hours*, which had a great success, and stimulated by Goethe he wrote his finest lyrics and ballads. In 1800 he completed his triple drama on the history of Wallenstein—"Wallenstein's Lager," "Die Piccolomini," and "Wallenstein's Tod." Between 1799 and 1801 he produced the dramas, "Marie Stuart," "Die Jungfrau von Orleans," and "Die Braut von Messina," and "Das Lied von der Glocke," besides many other exquisite poems. In 1804 he completed "Wilhelm Tell," the last and one of the noblest of his dramatic works.

His friendship with Goethe drew upon both the bitter hostility of most of the secondary authors of Germany, and many attempts were made to estrange the friends. The splendid rhythm, rhetoric, and artistic completeness of form of Schiller's "Das Lied von der Glocke," and his classical ballads bore down all narrow criticism, and secured his fame as a poet in the universal judgment of the German people. For some time he wrote almost all night, taking stimulants, which undermined his health. He died at Weimar. The unselfish devotion of his life to his art is recognized with a fervor which takes no note of his early irregularities; and without ever having made the slightest profession of democracy he is everywhere celebrated in Germany as the poet of the people. The explanation of this fact must be sought for in the sincerity of his nature, no less than in the persecution of which he was temporarily

the object. Carlyle says of him: "He was a high ministering servant at truth's altar, and bore him worthily in the office he held."

Schism (sĭz'm), a division in the Church on points of worship and discipline. A schismatic is one who separates himself, or improperly cuts off others, from the Church. The New Testament word refers to differences rather than divisions. Some of the chief divisions, either voluntary or forced, are the Ebionite (second and third centuries), Novatian (251 A.D.), Miletian (305), Donatian (311), Arian (first under Damascus, 355; second under Miletian, 361), Nestorian (428), Monophysite (482). The great schism between the East and West (abt. 880) arose from hierarchical rivalry, between Pope Nicholas I and Photius, Patriarch of Constantinople. Their mutual excommunication dates 1054. The papal schisms concerning the election of popes were 963, 1159, 1164, 1168, 1178, and the great schism, with rival courts at Rome and Avignon, 1378–1429.

Schist. See CRYSTALLINE SCHISTS.

Schlegel (shlā'gĕl), **August Wilhelm von,** 1767–1845; German critic and poet; b. Hanover. Lectured at Jena, 1796–98, and was professor there, 1798. Lectured in Berlin, 1801. Traveled several years with Mme. de Staël. In 1818 was Prof. of Art and Literature at Bonn, and died there. His translation of Shakespeare is still the classic German version. In 1798 he founded the *Athenäum*, a periodical which became the chief organ of the romantic school, which opposed the extreme classicism of Goethe and Schiller. While Schlegel's own poetic attempts, though perfect in regard to form, lack the true poetic spirit, he is to be mentioned among the founders of the study of German antiquities, of Sanskrit and comparative philology. His best work, besides his translations, is his "Vorlesungen über dramatische Kunst und Litteratur."

Schlegel, Friedrich von, 1772–1829; German poet and critic; b. Hanover. Lectured in Jena, 1801; in Paris, 1802; then settled in Vienna. Schlegel pointed to Greek art as the model of artistic perfection, and praised Goethe as the "dawn of true art and beauty." Later, with his brother August Wilhelm, in the *Athenäum* he was a zealous advocate of romanticism. His own poems are of little value; but he opened the way for the study of Sanskrit in Germany with his book "Ueber die Sprache und Weisheit der Inder." Toward the end of his life he represented the pernicious elements of romanticism. He advocated the reëstablishment not only of the papal hierarchy, but also of mediæval feudalism, and the injurious effects of his and his associates' influence in this direction were only gradually overcome.

Schleiermacher (shlī'ĕr-mä-chĕr), **Friedrich Ernst Daniel,** 1768–1834; b. Breslau; brought up with the Moravian Brethren, and completed his course at Halle; was a chaplain in Berlin, and, 1804, Prof. of Theology and Philosophy at Halle; 1809–34, Prof. of Theology at Berlin. He labored to effect a union of the Lutheran and Reformed churches on the broad basis that demanded unity in the spirit of Protestantism and allowed diversity as to doctrines and modes of worship. The fundamental point of view of his system is this: Religion is not a knowing nor a doing, but a feeling—a feeling of the universal life of the Infinite, and of the dependence of the Ego upon it. Hence religion begins with the feeling of dependence. Reflection upon this feeling gives rise to descriptions of it, and hence the statement of religious principles and dogmas. All religions are historic and positive. Among these Christianity holds a unique place, inasmuch as in it is found the reconciliation with the Infinite, hence the very essence of religion itself.

The most important of his writings are: "Discourses on Religion," "Monologues," "Outlines of a Critique of Previous Systems of Ethics," "Translation of Plato," "The Christian Faith according to the Principles of the Evangelical Church," "Theological Encyclopædia."

Schleswig-Holstein (shlāz'vĭg-hōl'stĭn) former province of Prussia; long the Danish duchies of Schleswig, Holstein, and Lauenburg; bounded N. by Denmark, S. by the Elbe, E. by the Baltic, and W. by the North Sea, which are connected by the Kaiser Wilhelm Canal; area, 7,273 sq. m. The duchies were seized by Germany at Bismarck's instigation, Feb. 1, 1864, and formally incorporated into the Prussian Kingdom, 1866. A strong Danish-German antagonism prevailed in the stolen duchies, and the Schleswig-Holstein problem was one of the most serious ones before the Peace Conference, as Denmark insisted on the return of her former territory, which was granted in the peace treaty. Both the Kiel Canal and the Heligoland base of the former German navy are within the administrative limits ot Schleswig-Holstein. The province was highly important to Prussia, on account of the harbor of Kiel. Pop. (1910) 1,628,004; capital Schleswig.

Schley (slī), **Winfield Scott,** 1839–1911; American naval officer; b. Frederick Co., Md.; in the Civil War engagements which led to the capture of Port Hudson; 1884, commanded the Greely Arctic relief expedition; as rear admiral served under Sampson in the war with Spain.

Schliemann (shlē'män), **Heinrich,** German archæologist; b. Neubuckow, Mecklenburg-Schwerin. Family misfortunes compelled his entrance into commercial life, but after amassing a fortune in Russia he devoted himself to archæological study. He began in 1870 to excavate in the Troad on the hill of Hissarlik, and the work was only brought to a close in 1892. Schliemann's belief in the historic reality of the Homeric epic has to a certain extent been vindicated, and his first success was followed up by excavations at Mount Athos, at Mycenæ, Ithaca, Tiryns, and Orchomenos. The discoveries at Mycenæ, in particular, were not only of great intrinsic value, but they revolutionized the prevalent ideas of the prehistoric civilization of Hellas, and threw a flood of light upon the rise and development of Greek art. He published many accounts of his work.

Schmal'kalden, or **Smal'cald,** town in the province of Hesse-Nassau, Prussia; 19 m. SW.

of Gotha; pop. (1897) 8,726. The league of the German Protestant princes was formed here in 1531 to protect the Protestants against Charles V and the Catholic states, and in accordance with it the Articles of Smalcald were drawn up by Luther. The league was disbanded after the defeat of the Protestants at Mühlberg, 1547.

Schnitz'er, Eduard. See EMIN PASHA.

Schnorr von Karolsfeld (shnôr fŏn kä'rōlss-fĕlt), 1794–1872; German painter; b. Leipzig; professor at the Academy of Munich, 1827, and director of the picture gallery at Dresden, 1846. His principal works are frescoes in the palace in Munich illustrating the Nibelungen and the history of Charlemagne, Barbarossa, and Rudolf of Hapsburg, and Bibel in Bildern, a collection of woodcuts giving the Bible history, which show wonderful animation, variety, and power. His "Luther at the Diet of Worms," has often been reproduced.

Schofield (skō'fēld), **John McAllister,** 1831–1906; American military officer; b. Chautauqua Co., N. Y.; graduated at West Point, and promoted brevet second lieutenant, 1853; 1855–60 he was assistant Prof. of Natural Philosophy at West Point; was major First Missouri Volunteers, 1861, and participated in the operations in Missouri; brigadier general U. S. Volunteers, November, 1861, and in October, 1862, placed in command of the Army of the Frontier; major general U. S. Volunteers, 1862, and in 1864 commanded the Army of the Ohio; was with Sherman in the Georgia campaign, and defeated Hood at the battle of Franklin, November 30, 1864; appointed brigadier general U. S. army. In N. Carolina he fought at Kinston, March 8th-10th, and upon Johnson's surrender, April 26th, executed the terms of the convention; Secretary of War, 1868–69; held various commands, then in 1895, lieutenant general U. S. army, retired for age.

Scholas'ticism, the theology and philosophy presented in the schools and universities of the Middle Ages, notably those of the thirteenth century. Strictly, it does not mean a doctrine, but a manner of handling certain truths, which is highly technical, didactic, analytic, implying a severe and exact use of the reasoning faculties. It is strictly syllogistic, and tends to present the doctrines of Christian theology and philosophy in a complete methodical system, in which an even balance and a due proportion shall be everywhere observed. The excess of subtlety of mediæval scholars is not to be laid at the door of their method or their system, whose chief element is the employment of philosophy in the service of religion. It was only in the decay of scholasticism that such refiners of doubt appeared. It is not entirely true that all the scholastics are distinguished by cold formalism of style. The style of Abelard is easy and agreeable, while Dante, one of the princes of scholasticism, is the glory of Italian literature.

The masters of mediæval philosophy had a great task, *viz.*: to endow with noble ideals, intelligible, tangible, and familiar, a generation just issued from barbarism, and for this end the categorical exposition of principles and truths was the best means; it was left to future generations and to spontaneous action to present the same in a more charming garb. A glance at the weighty philosophical problems which constantly attracted the attention of the schoolmen is sufficient to impress a frank, intelligent mind with respect. They were the relations of faith and reason, the nature and means of knowledge, the reality of observations, phenomena, experience; the personality of man, the nature of the universe, immortality, the future life, the rights and duties of the factors of society, the forms and functions of government. The most perfect specimen of this philosophic spirit is St. Thomas Aquinas, and the most admirable of the scholastic works is his "Summa Theologica"—"a vast encyclopedia of the moral sciences, in which whatever could be known of God and man and their relations was set down; a monument severely harmonious, magnificent in design, but yet unfinished, like so many other of the great mediæval undertakings."

The origins of scholasticism are not to be found in an adaptation of the philosophy of Aristotle; they are as old and deep as those of other great phenomena of the time. Usually its history is said to begin with St. Anselm of Canterbury (1033–1109) in whose "Monologium" the outlines of scholastic dialectic method are distinctly visible, and at the end of the thirteenth century was its apogee, with Albert the Great, St. Thomas, and St. Bonaventure as its highest exponents.

Schom'berg, Frederick Hermann (Duke of), abt. 1616–1690; English soldier; b. Heidelberg, Germany. He won distinction in the Dutch and French armies; in Portugal during the war of liberation, he compelled Spain to recognize the independence of that country under the dynasty of Braganza (1668). He left France on the revocation of the Edict of Nantes, 1685, and was appointed by William, Prince of Orange, his second in command in the expedition to England, 1688; was made Duke of Schomberg and Master of the Ordnance, 1689; took a leading part in the expedition against Ireland, and was killed at the battle of the Boyne.

Schön'bein, Christian Friedrich, 1799–1868; German chemist; b. Würtemberg; Prof. of Chemistry at Basel, 1828; discovered ozone, 1839; invented gun cotton, 1845.

Schön'brunn, an imperial palace a few miles from Vienna, built in 1744 by Maria Theresa. It contains 1,441 rooms, among which are several magnificent staterooms. The Peace of Vienna was signed here, October 14, 1809.

School'craft, Henry Rowe, 1793–1864; American ethnologist; b. at Watervliet (now Guilderland) N. Y.; in early life studied the art of glass making. He was geologist to an exploring expedition to the upper Mississippi and Lake Superior copper region, and published a "Journal" (1821); was in 1822 Indian agent for the tribes of Lake Superior; was at the head of a scientific expedition which in 1832 explored for the first time Lake Itasca and the sources of the Mississippi; negotiated in 1836

a treaty by which the U. S. purchased from the Chippewas a tract of 16,000,000 acres on the upper lakes, after which he became a superintendent of Indian affairs for the Northern department; published "Algic Researches" (two volumes, 1839), a collection of Indian tales and legends; removed to New York, 1841; superintended at Washington the publication of a series of reports on all the Indian tribes of the U. S. Died at Washington, D. C., December 10, 1864. Among his publications were a "Narrative of an Expedition to Itasca Lake, the Actual Source of the Mississippi," "Oneota, or Characteristics of the Red Race of America," "Notes on the Iroquois," and "Personal Memoirs of a Residence of Thirty Years with the Indian Tribes."

School Laws. In America, the term *school laws* generally designates those which relate to the conduct of the public school maintained at the expense of the public. Most of these laws are purely statutory and constitutional. In most of the states a teacher must, before entering upon his duties, obtain a certificate of his qualifications. Only average qualifications are required, and only reasonable attention to the discharge of his duties. The statutory regulations as to the manner of the making of the contract for the employment of teachers must be strictly complied with. The board of directors or trustees may in good faith make contracts for the employment of teachers for a term extending beyond their own term of office; but if it can be shown that this action was taken with the intention of forestalling their successors, the contract is voidable if the teacher be in complicity with them in this intent.

The rights of the teacher to compensation cannot be nullified or the term of service shortened by abolishing or removing the school where the teacher was to have taught, or in any other way rendering it impossible for him to perform his services.

The authorities have a lawful right to discharge a teacher for incompetency, or any other cause which prevents him from performing his duties. In some states the statutes provide that a teacher cannot be dismissed, even for cause, except upon notice and being given opportunity for trial. The public schools must provide accommodations and instruction for all children of legal school age whose parents reside within the school district. The fourteenth amendment of the Constitution of the U. S., which provides that no state shall deny to any person within its jurisdiction the equal protection of the laws, does not prohibit the establishment of separate schools for white and colored children, provided the schools afford equal privileges and educational facilities; but if such schools are not provided the colored pupils cannot be legally excluded from the other schools, and a writ of mandamus will be issued to compel the reception of pupils who are so deprived of their educational privileges. The teacher has a right to maintain reasonable discipline and compel obedience to reasonable regulations in any lawful manner, and to this end he may, in the absence of statutory prohibition, inflict corporal punishment upon the pupil. It is held that the teacher is *in loco parentis* to the pupil, and by virtue of this has, by way of delegation, the power of imposing such restraint and administering such punishment as may be required for proper exercise of the duties of his office. A mistake of judgment on the part of the teacher in the exercise of this right of correction, if his acts be done in good faith and do not inflict lasting injury, does not give rise to an action for damages for the injury suffered from such punishment; but punishment cannot be legally inflicted except by way of correction of some specific offense committed by the pupil in violation of a reasonable rule or regulation, for which violation he is given to understand that the punishment is inflicted.

Exclusion from the school or suspension of school privileges may be resorted to as a means of enforcing discipline. The teacher's power of punishment extends not only to acts committed during school hours, but also to acts detrimental to school discipline done at other times. The question of what constitutes reasonableness in a rule is a matter which varies so widely. A rule requiring scholars to be vaccinated under penalty of exclusion; a rule requiring the pursuance of particular studies; a rule making it the duty of the teacher to keep a record of the standing of each pupil, and that this shall be forwarded to the parent or guardian, and signed and returned by him; a rule authorizing the expulsion of a scholar for absence, even under the direction of the parent and the spiritual adviser of the child, in order to attend religious services; a rule providing that the pupils absent six half days in four consecutive weeks without satisfactory excuse shall be suspended, are all reasonable and proper. Among rules which have been held to be unreasonable are one requiring that pupils shall be suspended for failing to bring into the schoolroom each day a stick of wood for the fire; a rule that a scholar living with his parents shall not go to a party; a rule requiring a pupil to pay for damage done to school property, under penalty of expulsion, etc. The right to require the reading of the Scriptures in school has in some cases been held as unconstitutional, on the ground that it is sectarian instruction. But such a rule is generally sustained as being constitutional.

Schools, Com'mon, public institutions for elementary education. In Sparta the state undertook the education of the children, but the instruction was mainly physical, and did not reach the peasant classes. In Attica there were public schools for all classes, the education of the children was a religious duty among the Jews, and after the captivity they developed a system of public schools. In Rome, while private schools were numerous, their advantages only accrued to the patricians and such plebeians as possessed property; after the conquest of Gaul, schools were instituted in the imperial cities. After the establishment of Christianity the duty of the authorities to educate the young was recognized. All the early settlers who were driven to N. America by persecution turned instinctively to the school as a

means of perpetuating their religious views and maintaining their liberties. Puritans in New England, Dutch in New York, Swedes in Delaware, Germans in Pennsylvania, and Huguenots and Scotch-Irish in all colonies made great sacrifices to secure education for the young. At first all the schools were connected with the Church, but as government became secularized the schools followed the government. There are at present in the U. S. as many systems as there are states. The national Government collects and distributes information through the Bureau of Education, cares for the military and naval instruction, controls the schools in the territories and in the District of Columbia, and has made large grants of public lands to aid education in the various states.

While each state has its own system of education, there is a considerable uniformity. The schools in all the states are secular, and no religious instruction is allowed, though in most places the Bible is read at the beginning of the session, but no exposition of the Bible is allowed and no religious formula can be taught. The schools are all free, and the doctrine that all the property of the state should be taxed for educating all the children of the state is universally recognized. School money is drawn from permanent educational funds, derived originally from public lands or special state grants; from a state tax, disbursed on a basis of school population and school attendance; and from local school taxes. To-day the term common schools is officially applied to public schools of the elementary grades, the first eight years of the course of study, and the secondary grade, which includes the ninth to the twelfth years. Public-school attendance is compulsory in most of the states and territories, and the school age in most states is from six to twenty-one. In many states children of school age compelled to work in factories or elsewhere must attend school for a varying number of hours per week. The public-school system of the U. S. has been extended to Porto Rico, Hawaii, the Philippines, and other possessions with excellent results. The following is a synopsis of reports covering the common-school branch of public education for the school year, 1915–16:

Estimated population	102,017,312
Persons 5 to 18 years of age	26,846,976
Pupils enrolled in schools	20,351,687
Per cent. of population enrolled	19.95
Per cent. of school population enrolled	75.81
Average daily attendance	15,358,927
Male teachers	123,038
Female teachers	499,333
Schoolhouses, owned and rented	281,524
Value of all school property	$662,446,536
Expenditures	640,717,053
Expenditure per capita of population	23.87
Expenditure per pupil	41.72

See BUSINESS COLLEGES, CHILD STUDY, COLLEGES, EDUCATION, KINDERGARTEN, PEDAGOGICS.

School'men. See SCHOLASTICISM.

Schoon'er, a vessel with two or more masts and fore-and-aft rigged; or, if the foremast have a square topsail, the vessel is called a topsail schooner. When sailing by the wind, schooners have an advantage over square-rigged vessels, and they are easily handled by a small crew.

Schopenhauer (shō'pĕn-how-ĕr), **Arthur**, 1788–1860; German philosopher; b. Dantzic. He entered the Univ. of Göttingen, 1809, and gave especial attention to Kant and Plato; wrote his essay, "On the Fourfold Root of the Principle of Sufficient Reason," for his degree at Jena in 1813; adopted Goethe's theory of colors, and wrote in 1816 an essay "On Seeing and Color." His principal work, "The World as Will and Representation," was published in 1819. After a visit to Italy he settled at Berlin Univ. as docent, and remained there until 1831. Want of success as a lecturer caused his withdrawal from Berlin in 1831 to Frankfort-on-the-Main, where he spent the rest of his life in seclusion. His characteristic doctrine is pessimism. The world is the worst of possible worlds. We can alleviate our lot in it by sympathizing with the suffering, and in a still more effectual way by an asceticism which destroys our will to live.

The Will is the only substantial essence in the universe; it is Kant's "thing in itself." The intellect, consciousness, our entire theoretical activity, is simply a result of the Will in its higher forms. Mere matter, as the product of forces, is the lowest stage, the result of blind Will; finally, the Will objectifies itself in organisms, which work from internal motives, and select likewise their own food, and hence need intelligence to convert blind exciting impulses into motives. With the brain, and intelligence which is its function, there arises simultaneously, as result, the world as representation with all its forms: subject and object, space and time, causality, etc. The brain is therefore only the tool or instrument of the Will to live. He adheres to the Oriental idea of annihilation, and considers the Christian idea of immortality a delusion. Hence "the happiest moment of life is the completest forgetfulness of self in sleep, and the wretchedest is the most wakeful and conscious." Hence the highest act of morality is resignation, renunciation. Enjoyment of art is the only permissible pleasure, because that is cognition devoid of Will. Besides his three works already named, the following are important: "Upon the Will in Nature," "The Freedom of the Human Will," "The Basis of Morals." "The Parerga and Paralipomena" contains his views in a fragmentary form, and is the most popular of his works.

Schouler (skō'lĕr), **James**, 1839– ; American lawyer and historian; b. Arlington, Mass.; graduated at Harvard, 1859; served in the Civil War; practiced law in Boston and Washington, D. C.; author of legal text-books on Domestic Relations, Personal Property, Bailments, Wills, Executors, and Administrators. He is more widely known as the author of "History of the United States under the Constitution," "Life of Thomas Jefferson," "Alexander Hamilton," "Eighty Years of Union," "Americans of 1776."

Schouten (skhow'tĕn), **Willem Cornelis**, 1567–1625; Dutch navigator; b. Hoorn. Employed

by the Dutch East India Company, but resigned 1610, and engaged to find a new route by the W. to the E. Indies. He passed by the Strait of Magellan, discovered the passage named by him Lemaire Strait, was the first to double Cape Horn, and reached the Indies in safety. The Cape Horn route was speedily adopted as preferable to the Strait of Magellan; it is still used for sailing vessels.

Schu'bert, Franz, 1797–1828; Austrian composer; "the immortal melodist"; b. Vienna. He was trained by the organist of the parish church; became leader of the choristers' school; composed his first symphony in 1813; in 1818 became teacher of music in the family of Count Esterházy; the publication (1821) of his "Erl King" gained him popularity; gave his first and only public concert in 1828 in Vienna. He is best known by his songs, several hundred in number. His music was scarcely known to the outside world during his lifetime. His fecundity was marvelous. His MSS. prove the ease and rapidity with which he wrote. Among his larger works may be mentioned the great "C major Symphony (No. 9)," the "Unfinished Symphony," many fine sonatas, trios for piano, violin, and violoncello, the "Mass in E flat," etc. The chief characteristics of Schubert are the freshness of his delightful melodies, supported by harmonies of equal interest.

Schu'mann, Robert, 1810–56; German composer; b. Zwickau; after a course in law and philosophy at Heidelberg, he settled in 1830 at Leipzig, to study under Wieck, an eminent piano teacher; but having crippled his right hand by experimenting with a machine to make the muscles flexible, he was forced to devote himself to composition. In 1843 he was appointed Prof. of Composition at Leipzig, and in 1850 musical director at Düsseldorf. While living at Düsseldorf he became deranged, attempted suicide in the Rhine, was rescued, but never recovered his reason. Died at Endenich. With the exception of the oratorio, Schumann's works include almost every art form. Four symphonies, several cantatas, an opera, a mass, sonatas, concertos, quartets, and many much-admired songs. The symphonies have been accorded a rank immediately after those of Beethoven. The opera "Genoveva" was a failure, but his cantata "Paradise and the Peri" is still favorably received. Schumann possessed literary ability, and founded the *Neue Zeitschrift*, a music review to which he contributed important articles. He was the founder of the romantic or emotional school. There is a certain semimystical trait about a number of Schumann's compositions, which, however, does not prevent him from being clear and strong in the majority of his works, at least in those composed prior to the time when his mind began to be clouded. His wife, CLARA (WIECK), 1819–96, b. Leipzig, the most celebrated female pianist of her day, contributed greatly to a correct understanding of her husband's works by her masterly interpretation of them. Further, she may be said to have first introduced Chopin to the German music world.

Schurz (shŏrtz), **Carl,** 1829–1906; German-American statesman and author; b. Liblar, near Cologne; educated at Cologne and the Univ. of Bonn, 1846–48; took part in the revolutionary movements of 1849–50. After spending some months in Paris (1851–52) he settled in the U. S.; became a leader of the German element of the newly founded Republican Party. He began the practice of law at Milwaukee, 1859; appointed by Lincoln minister to Spain, 1861, but resigned to enter the army. He was appointed brigadier general of volunteers, 1862; major general, 1863; commanded a division in the second battle of Bull Run and in the battle of Chancellorsville; was temporarily in charge of the Eleventh Army Corps at Gettysburg; took part in the battle of Chattanooga, and resigned May 6, 1865. Having settled in Missouri, he was U. S. Senator from that state, 1869–75. The policy of Grant's administration drove him into the "Liberal" movement, and he presided over the convention which nominated Horace Greeley for the presidency, 1872. In 1875 he became a resident of New York. He took part in the political campaign of 1875 in Ohio, advocating the election of Gov. Hayes on a "hard-money" platform, was one of the callers of the independent conference of May 15th, in New York, and Secretary of the Interior, 1877–81; 1881–83 he was editor of the New York *Evening Post*. In 1884 he repudiated the candidacy of Blaine, and was a vigorous supporter of Cleveland because of Cleveland's adherence to civil-service reform. Civil-service reform, tariff reform, and the purification of New York politics received his hearty support. His "Life of Henry Clay" gave him a high place as an historical critic and interesting writer, and his "Autobiography" contains an interesting account of people and parties during and after the Civil War.

Schuyler (skī'lĕr), **Philip John,** 1733–1804; American general; b. Albany, N. Y. In 1775 he was a delegate to the Continental Congress, which appointed him a major general with the command of the army in New York, but ill health compelled him to discontinue his plans for an invasion of Canada. Later conducted the operations against Burgoyne, but after St. Clair's evacuation of Ticonderoga suspicions of disloyalty against Schuyler caused him to be superseded by Gates. His conduct was afterwards fully approved by a court of inquiry, but he refused to resume command, though he continued to render important services. He was a member of the Continental Congress 1778–81, and U. S. Senator 1789–91. He contributed largely to the code of laws adopted by New York State.

Schuylkill (skōl'kĭl), river which rises in Schuylkill Co., Pa., and after a SE. course of 125 m. flows into the Delaware at Philadelphia. Its lower portion affords extensive wharfage. The river was (1816–25) adapted to slack-water navigation to Port Carbon. The river affords the greater part of the water supply for Philadelphia.

Schwann, Theodor, 1810–82; German physiologist; b. Neuss. He was assistant in the Anatomical Museum at Berlin till 1838. He discovered pepsin and its function in digestion,

the envelope of nerve fibers, the organic nature of yeast, and made a series of researches on muscular contractility and other physiological subjects. He was Prof. of Anatomy at the Roman Catholic Univ. of Louvain, 1838–48, and at Liège from 1848. Died at Cologne. His cell theory, which is the basis of modern histology, was published in "Microscopical Investigations on the Accordance in the Structure and Growth of Plants and Animals."

Schwanthaler (shvän'tä-lêr), **Ludwig Michael,** 1802–48; German sculptor; b. Munich; studied in Rome, but wrought in Munich. His statues, decorations, and models are seen in the great cities of Germany, but chiefly in Munich. He executed the frieze of the Barbarossa hall, the colossal statue of Bavaria more than 200 ft. in height, and the metopes of the Ruhmeshalle which adjoins it, the colossal bronze statues in the throne room of the palace at Munich, and the monumental images in the Walhalla. He was the chief representative of the "romantic" school in sculpture, and his works are often overelaborated and deficient in truth to nature and reality.

Schwartz, Berthold (true name said to have been KONSTANTIN ANCKLITZEN), reputed inventor of gunpowder; received the name of Berthold on entering a Franciscan monastery at Mentz, Cologne, or Gosslar, and was called Schwartz (black) on account of his passion for the black arts. According to legend, he invented gunpowder in 1259 (the dates 1320 and 1354 are also given). The details of his life are uncertain.

Schwarzburg-Rudolstadt, a principality of the German Empire, in Thuringia, bordering on Prussia; area, 364 sq. m.; pop. (1905) 96,835. It is partly mountainous. The chief rivers are the Saale, Ilm, and Schwarza. The principal products are minerals and timber. Capital, Rudolstadt; pop. (1905) 12,495.

Schwarzburg-Sondershausen (sŏn'dêrs-howzĕn), principality of the German Empire, in the Prussian province of Saxony; area, 333 sq. m.; pop. (1905) 85,152. Capital, Sondershausen; pop. (1905) 7,383.

Schwarzenberg, princely family of Germany, descended from Erkinger von Seinsheim, who was ennobled in 1417 by Sigismund, and in 1420 bought the estate of Schwarzenberg. The most celebrated names of the family are: (1) KARL PHILIPP, 1771–1820; soldier; b. Vienna; distinguished himself in the battles of Würzburg, Ulm, Hohenlinden, and Wagram. After the peace of Vienna (October 14, 1809), as Austrian ambassador he negotiated the marriage between Napoleon and Maria Louisa. Napoleon placed confidence in him, and demanded that he should command the Austrian contingent in the Russian campaign of 1812. His slowness and inefficiency have provoked criticism from French historians, but Napoleon never doubted his loyalty. When Austria joined Russia and Prussia he was made commander in chief of the allied army, gained the battle of Leipzig (October 16–18, 1813), and led the army victorious into Paris.

FELIX LUDWIG JOHANN FRIEDRICH, 1800–1852; statesman; a nephew of the preceding; b. Krumau; entered the Austrian army in 1818, and was made a lieutenant field marshal in 1848, before the battle of Custozza, but was mostly employed in diplomatic missions, and, November 22, 1848, became Chancellor of the Austrian Empire, and confronted a difficult situation with courage and energy. By the aid of Russia he put down the revolution in Hungary, and in a very short time succeeded in tying together once more the discordant parts of the Austrian Empire by means of a military and bureaucratic government. He raised the credit of the state, and baffled all the Prussian plans in Germany by drawing the S. and middle states over to the Austrian side. FRIEDRICH JOHANN JOSEPH CELESTINUS, a brother of the preceding; b. Vienna; was Archbishop of Salzburg 1836, cardinal 1842, Archbishop of Prague 1849. He opposed the declaration of the dogma of the papal infallibility as inopportune, but accepted it afterwards.

Schwat'ka, Frederick, 1849–92; American explorer; b. Galena, Ill.; graduated at West Point; second lieutenant, 1871; admitted to the bar in Nebraska, 1875; graduated in medicine, Bellevue Medical College, New York, 1876. In 1878 he conducted the Arctic expedition which cleared up the mystery surrounding the fate of Sir John Franklin's expedition. He returned to duty in the army 1880, but resigned 1885; 1883–89 he made three exploring journeys to Alaska, and descended the Yukon on a raft from its source to its mouth. In 1889 he explored Mexico for remains of Aztec civilization and of the cliff and cave dwellers. Died at Portland, Ore. Wrote "Along Alaska's Great River," "Nimrod of the North," and "The Children of the Cold."

Schwein'furth Green, or **Par'is Green,** an aceto-arsenite of copper of variable composition. Other names are *Imperial, Vienna, Emerald,* and *Kaiser Green.* It has been very extensively used for wall and other paper staining, for artificial flowers, and as a vermin exterminator. Much has been written with regard to the dangers of arsenical wall paper, but distinguished chemists deny the possibility of the production of any arsenical gases from wall paper, and the alarming suggestions concerning arsenical wall paper are regarded as without foundation.

Schwerin (shvā-rēn'), capital of the Grand Duchy of Mecklenburg-Schwerin, Germany; on the W. side of Lake Schwerin. It has good educational institutions, museums, galleries, and collections, and numerous factories. Pop. (1907) 41,628.

Sciacca (shäk'kä), town in the province of Girgenti, Sicily; 37 m. NW. of Girgenti. It occupies a site near the ancient *Thermæ Selinuntinæ.* At the foot of Monte S. Calogero are hot wells that have been used as baths from Phœnician times. Off the coast coral banks are worked. Pop. (1901) 20,090.

Sciat'ica, a neuralgia or neuritis of or about the sciatic nerve. It may be due to exposure, fatigue, rheumatism, anemia, damp, cold cli-

mate, etc. Its chief symptom is an abnormal sensation in the region of the back of the thigh, with darting or burning pain. The treatment should be constitutional as well as local. If the sciatica is due to rheumatism or gout, the diet should be sparing of meat and no stimulants should be taken. Potassium bicarbonate or iodide and aperients will alleviate the condition; the continuous galvanic current is of benefit, and in extreme cases blisters and the cautery as counter irritants are employed. Good results have been obtained in severe cases by exposing and stretching the sciatic nerve, at the same time breaking up its adhesions to surrounding tissues.

Sci'ence, knowledge reduced to order and so classified and arranged as to be easily remembered, readily referred to, and advantageously applied. All science is based on the assumption that the laws of nature are immutable. From this point of view science may be regarded as a knowledge of the laws of nature, embracing the processes of experiment, observation, and comparison, by which they are discovered, and the modes of reasoning by which their operation in the production of phenomena is made known. Hence most widely it signifies the knowledge of a truth in relation to other truths. Various attempts have been made to classify the sciences, so as to make clear their relations to each other. Of these the best known is that of Comte, who first explicitly drew the distinction between abstract and concrete sciences.

Comte classified the sciences in order ranging from those dealing with the simplest phenomena to those dealing with the most complex, as follows: mathematics, physics, chemistry, biology, and sociology. (See POSITIVISM.) Herbert Spencer classified science into three main groups: the abstract, the abstract-concrete, and the concrete. Under abstract sciences he included the universal laws of relation as dealt with by logic and mathematics. The abstract-concrete group included the law of forces—mechanics, heat, electricity, magnetism, and chemistry. The concrete sciences include astronomy and geogeny, and under the latter division are grouped mineralogy, meteorology, geology, biology, psychology, and sociology.

Scilly (sĭl'ĭ) **Is'lands** (ancient, *Cassiterides*), a group belonging to Great Britain, situated 30 m. W. of Land's End, the SW. promontory of Cornwall. It consists of 140 isles and rocks, of which six are inhabited—St. Mary, Tresco, St. Agnes, Sampson, Bryher, and St. Helens. Area, 5,800 acres. Pop. about 2,500, of whom about 1,300 live on St. Mary, where Hugh Town, the capital, is situated. On Bishop Rock is one of the finest lighthouses of its kind. All the islands are rocky, consisting of granite with a thin layer of light sandy soil. The navigation around these isles is very dangerous. In 1705 the fleet under Admiral Sir Cloudesley Shovel fell upon these rocks, when his ship and several others were lost.

Scio (sĭ'ō), ancient, *Chios*; Turkish, SAKIS-ADASI; an island in the Grecian archipelago, separated from the coast of Asia Minor by the Strait of Scio, 4 m. wide in its narrowest part; area, about 320 sq. m.; pop. about 60,000, chiefly Turks. It presents a scene of perpetual verdure, and for its beauty is called the Queen of the Ægean. The staple production is gum mastic. Originally Chios was peopled by Tyrrhenian Pelasgians and Leleges, and it became an Ionian colony. The chief city, Chios, claimed to be Homer's birthplace. The Persians devastated it in 494 B.C. After the battle of Mycale (479) it joined the Athenian league, and in 358 it became again independent. Philip V of Macedon took it in 201; afterwards it became subject to Rome. Early in the fourteenth century the Turks captured the capital and massacred the inhabitants. The Genoese held Scio from 1346 to 1566, excepting a short interval of Venetian domination, the Turks holding it ever since. During the Greek revolution the Sciotes rose in 1822; the Turks massacred 23,000 of them, 47,000 were sold into slavery, and 5,000 fled. In June Canaris attacked the Turkish fleet in the harbor of Scio with fire ships, and destroyed the flagship with the capudan pasha. Scio, or Kastro, the capital, near the middle of the E. coast (pop. 14,500), has a harbor defended by a castle. Many of the Greek merchant princes originated in Scio, and their homesteads are the finest mansions in the town.

Scioppius (stsē-ŏp'ē-ŏs), **Kaspar**, 1576–1649; German classical scholar and controversialist; b. Neumark; studied at Heidelberg; abjured Protestantism and became a Roman Catholic in 1598: His fanatical propaganda earned for him the titles of Duke of Clara Valle in Spain and patrician of Rome. His virulent invectives against the Jesuits and Joseph Scaliger and his insane diatribes against Cicero, Varro, and many post-Augustan writers alienated even his own partisans, so that he was compelled to publish many of his polemical writings under an assumed name. Died in Padua.

Scioto (sĭ-ō'tō) **Riv'er**, stream which rises in Auglaize Co., Ohio, and discharges into the Ohio. It is 200 m. long. Its valley is very productive.

Scipio (sĭp'ĭ-ō), the name of a distinguished Roman family of the Cornelian gens, the most important of whom follow: PUBLIUS CORNELIUS SCIPIO, father of the elder Africanus; consul in 218 B.C. He attempted to thwart the Carthaginians at the Rhone, but Hannibal had already passed the river when Scipio arrived. Scipio thereupon returned by sea to Cisalpine Gaul, and prepared to meet the enemy as they descended the Alps. He suffered defeat at the river Ticinus, and again at the Trebia. In 217 he joined his brother Gnems in Spain, where they successfully fought against the Carthaginians until 211 B.C., when they were killed in battle.

PUBLIUS CORNELIUS SCIPIO, called AFRICANUS MAJOR, 237–183 B.C., a son of the foregoing, was present at the battle of the Trebia, and served as a military tribune at Cannæ (216). After the death of his father in Spain he presented himself as a candidate for the office of proconsul to continue the campaign, and was elected. In three years he made the

Romans complete masters of Spain. He was consul in 205, and advocated an aggressive policy upon Carthage; but the conservative party at Rome was too strong, and the necessary forces were withheld. Scipio called for volunteers, and landed on the African coast in 204, and in 203 defeated the Carthaginians and Syphax. Hannibal was recalled from Italy and placed in command, but the decisive battle of Zama completed the rout of the Carthaginians. The political and military importance of Carthage was greatly reduced, but its commercial interests were not disturbed. The surname Africanus was conferred upon him, and Scipio then lived in honored leisure for some years; but in 194 he was again chosen consul, and in 193 he was one of the ambassadors to King Antiochus. In 190 he served with his brother against Antiochus, and with him was accused of misappropriating funds received from the king. The charges were probably not true, but Scipio with arrogance refused the vindication of a trial and averted the prosecution by reminding the people that it was the anniversary of his victory at Zama and called on them to follow him to the capitol to pray that the gods would grant the Roman state other citizens like himself. Scipio spent the remainder of his life on his estate at Liternum. He was a friend of the new culture and refinements of civilization which was made the basis for attacks by his political opponents. His bearing was haughty and showed a consciousness of his own superiority. He regarded himself as the special favorite of the gods. His conduct was often characterized by a disregard of the forms of government, and thus in spite of his popularity he provoked the jealousy of others in public life.

PUBLIUS CORNELIUS SCIPIO ÆMILIANUS, AFRICANUS MINOR, 185–129 B.C. (a son of Æmilius Paulus), was the grandson, through adoption, of Scipio Africanus. In the years between the death of the elder Africanus and 150 B.C. Carthage had recovered its commercial importance, and because of wars with the Numidian king Masinissa, who shared with it the control of Africa, was suspected of planning to recover its ancient political position. Thus the Carthage haters at Rome instigated a declaration of war in 149, and Scipio was elected consul to take charge of it. After two years of fierce fighting and siege Carthage was taken and totally destroyed. In 134 Scipio was again consul, and by his ability put an end to the long siege of Numantia in Spain, capturing and destroying it. The surname Numantinus was bestowed upon him. Scipio was always a moderate aristocrat, and his approval of the death of Tiberius Gracchus made him many enemies, at whose instigation he was believed to have been assassinated. He was devoted to the new Greek culture, especially in literature, and was the center of a coterie of literary men (the Scipionic circle), to which the poet Terence, the historian Polybius, the philosopher Panætius, the poet Lucilius, and others belonged.

Scire facias (sī'rē fā'shĭ-ăs), a common-law writ founded upon a record ordering the party against whom it is issued to appear in court and show cause why some act should not be done in favor of the party in whose behalf the writ was issued. In the U. S., in the Federal courts, a proceeding in the nature of a *scire facias* may be used to annul letters patent for an invention obtained through fraud. In the U. S., in some states, the writ is used as a mode of foreclosing mortgages and also as a method of enforcing mechanics' liens. There are other uses in which it has been made available by statute in various states, and in some other states it has been abolished for some purposes and a simple motion substituted in its stead.

Scis'sors-bill. See SKIMMER.

Sclo'pis de Salera'no, Paolo Federigo (Count), 1798–1878; Italian jurist. He prepared the Sardinian civil code of 1837; in 1848 Minister of Justice, and in 1849 member of the Senate, over which he presided till 1861, and later over the Senate of Italy till 1864. Victor Emmanuel appointed him in 1872 arbitrator at Geneva on the part of Italy under the Treaty of Washington, and he presided over the court of arbitration. His principal work is a history of Italian legislation.

Scone (skōn), **New,** village of Scotland, 9 m. NE. of Perth, on the Tay; pop. about 1,600, engaged in hand weaving. Of old Scone the principal remains are a market cross. Only scattered traces exist of its abbey, in which the kings of Scotland were crowned on the stone of destiny or "Jacob's pillow" (now in Westminster Abbey).

Sco'pas, a Greek sculptor of the fourth century B.C.; a native of Paros. He was a contemporary of Praxiteles, and with him stands at the head of the later Attic school of sculpture. The group of Niobe and her children in Florence and the Venus of Milo in Paris are attributed to him, though the latter probably belongs to the school of Phidias. His masterpiece was a group representing Achilles conducted to the island of Leuce by sea divinities.

Scores'by, William, 1790–1857; English Arctic explorer and physicist; b. near Whitby; went to sea in one of his father's ships when ten years old; reached the highest N. latitude, 81° 30′, that had then been attained, May, 1806; made important observations on the electrical phenomena of the Arctic regions. After seventeen voyages to the Greenland or Spitzbergen regions, he published his "History and Description of the Arctic Regions" and his "Journal of a Voyage" (1823). When over forty years of age, Capt. Scoresby passed through a course of literary and theological study; filled several pastorates; visited the U. S. 1842 and 1848.

Scor'pio. See SCORPIUS.

Scorpio'nes, a group of spiderlike animals. The young are born alive. Scorpions are best known for their poisonous character. The poison gland is in the last joint of the abdomen, its duct emptying in the terminal spine.

In tropical countries this sting is often fatal to man, but in the U. S., while very painful, it only occasionally causes death. The scorpions are largely nocturnal, living under logs and stones by day. They feed upon the juices of insects, which are killed by the sting. In

SCORPION.

confinement they will eat bananas. The scorpions have been found as far N. as Nebraska. About 200 species are known. They occur as fossils in the Silurian rocks. To the zoölogist the scorpions possess interest, as they are the most primitive of the *Arachnida* and because they show most striking resemblances to the horseshoe crab (*Limulus*).

Scor'pius, or Scor'pio, the eighth sign of the Zodiac; also a constellation, the Scorpion. Two thousand years ago the constellation and the sign coincided, but now, owing to the precession of the equinoxes, the constellation Scorpio is situated in the sign Sagittarius. It may be recognized by the bright red star Antares, with a smaller companion on each side of it and a curved row of stars toward the W. See ZODIAC.

SCORPIUS.

Scotch Confes'sion of Faith, drawn up by John Knox and his compeers at the request of the Scotch Parliament at Edinburgh, August, 1560, after the death of the queen regent, Mary of Guise, and the close of the civil war. It consists of a preface and twenty-five articles on the chief doctrines of religion, which are briefly, tersely, and vigorously stated. It agrees with the other Reformed confessions of the sixteenth century, but is more pronounced in its opposition to the Roman Catholic Church than most of them. It was rather hastily composed in four days, twice read article by article in Parliament, and adopted by the same as being "based upon the infallible word of God." The Roman Catholic bishops were called upon to object and refute, but kept silence. Seven years later (1567), after the abdication of Queen Mary, the confession was readopted, and the Reformed Kirk of Scotland formally acknowledged and established. In 1580 the confession was signed by King James II, and a supplementary confession (called the second Scotch Confession) added to it. It continued to be the only doctrinal standard of Scotland recognized by the civil government till the Revolution of 1688, but it was practically superseded by the Westminster Confession, which is more logical and complete, and was adopted by the Covenanters and the General Assembly during the Commonwealth.

Scotch Elm. See WITCH ELM.

Sco'tists, among the schoolmen, the followers of John Duns Scotus. Their principal adversaries were the Thomists. The Scotists held to freedom of the will and the immaculate conception of the Virgin. Franciscans were generally Scotists; the Dominicans, Thomists.

Scot'land, that part of Great Britain which lies N. of the Cheviot Hills and the Tweed. It is bounded on the N. and W. by the Atlantic, on the E. by the North Sea, on the S. by England and the Irish Sea. Its greatest extent, from Dunnet Head in the N. (58° 41′ N.) to the Mull of Galloway (54° 38′ N.), is 288 m.; area, 29,785 sq. m., of which islands comprise over one seventh. The coast line is considerable in proportion to the area, for it amounts to 2,300 m., 1 m. of coast to 12 sq. m. of area. No point of the country is farther than 40 m. from the sea. The E. coast is formed of soft sandstones and clays, and is generally low and shelving, while the W. coast is of hard rocks, rising boldly and intersected by many narrow lochs.

Scotland is divided into a Highland region in the N., a Lowland plain in the center, and an Upland region in the S. The long narrow valley of Glenmore (great glen) divides the Highlands, and the lakes in this glen are connected by the Caledonian Canal. The region to the N. of Glenmore is sterile and thinly peopled. Lofty mountains rise above its extensive moors, as Ben Dearg (3,547 ft.), Ben Wyvis (3,929 ft.), and Mam Soul (3,862 ft.).

The region to the S. of Glenmore is known as the Grampians. A central chain can be traced from Ben Nevis (4,406 ft.) in the SW. to the coast of Aberdeen. The Pass of Drumochter crosses this chain at an elevation of 1,488 ft. The N. Grampians branch off, and attain 4,296 ft. in Ben Macdhui. The S. Grampians culminate in Ben Lawers, 3,984 ft. Strathmore (the great vale) extends at the foot of the Highlands from Loch Lomond to Stonehaven. S. Scotland consists of a hilly region from St. Abb's Head on the German Ocean to Stranraer on the Irish Sea, culminating in Broad-law (2,754 ft.) and Merrick (2,764 ft.). The Cheviots (2,636 ft.) form the boundary between Scotland and England. The Lowland plain is occupied by limestones and coal measures, the hills being porphyritic rocks and basalt. Scotland is rich in coal and iron. Lead is found in the S.; building stone abounds.

The Tweed is a rapid stream, forming, in its lower course, the boundary between England and Scotland. The Forth deserves mention because of its firth. The Tay is the most important river of Scotland; it enters the Firth of Tay. The Clyde enters the Firth of Clyde below Glasgow. Scotland abounds in lakes. The largest are Loch Lomond (45 sq. m.), Lochs Awe and Ness (30 sq. m. each), Loch Shin (25 sq. m.). Scotland is the land of the pine and heather, though in the Lowlands beeches, oaks, and elms grow well.

Politically it is divided into thirty-three counties. The capital is Edinburgh. The population rose from 2,888,742 in 1851 to 4,759,521 in 1911, but thousands of homes have been destroyed and emigration increased by landowners in order that holdings might be converted into sheep walks or deer forests. These last alone in 1891 covered 4,040 sq. m. Of towns of over 50,000, in 1901 there were nine: Glasgow, Edinburgh, Dundee, Aberdeen, Leith, Paisley, Govan, Greenock, and Partick. The Gaelic Highlanders are descendants of the Picts and Scots, but they have absorbed many Northmen, Danes, and Frisians, while the Lowlanders have an Anglo-Saxon element. English is the predominant speech, though Gaelic is spoken by some 25,000 Highlanders, but is rapidly dying out.

Agriculture is carried on with great intelligence. The principal cereals are oats, barley, and wheat. Scotch beef and mutton are highly esteemed. The whole of Scotland was owned (1877) by 132,131 persons, of whom 171 held nearly sixty per cent of the entire area. The fisheries employ about 29,000 men permanently and 25,000 also occasionally. Herrings are a valuable export. Dundee and Peterhead still fit out whalers. The country is rich in coal and iron. Iron ores are usually associated with the coal measures, and the ore is smelted on the spot. Lead is mined at Wanlockhead and at Leadhills, near Loch Tay. The oldest ironworks are those of Carron, in Stirlingshire. The cotton industry has its centers at Glasgow and Paisley; the woolen manufacture is carried on at Hawick and Galashiels on the Tweed, but also in Stirling, Kilmarnock, and Bannockburn; carpets are made at Kilmarnock and Glasgow; Dundee and Dunfermline are the principal seats of the linen, hemp, and jute industries. The making of machinery and shipbuilding have their chief seats on the Clyde. Other industries of importance are printing, paper making, sugar refining, glass making, and the making of chemicals. Glasgow is the commercial capital.

Scotland was known to the Romans as Caledonia, and was inhabited by twenty-one savage tribes of Celtic race. To Roman invasion they offered an obstinate opposition. The Romans penetrated as far as Moray Firth, but abandoned the country with the rest of Britain early in the fifth century. From this period for several centuries the predominant race of Scotland is known in history as Picts. After the withdrawal of the Romans five tribes in the province of Valentia, who had become practically Romanized and civilized, established a kingdom called *Regnum Cumbrense*, also known as the Kingdom of Strathclyde. In 449 the Saxons overran the lowlands, and one of their leaders, Edwin, founded Edinburgh (Edwinsburgh). Abt. 503 Scotland was also invaded by the Scots, a Celtic tribe from Ireland, who established a kingdom on the W. coast. Little is known of it till the accession of Kenneth Macalpin in 836, under whom the Scoto-Irish or Scotch became the dominant race in the country, which now began to be called Scotland.

In 866 the Danes began to invade Scotland, and continued their incursions till 1014. Malcolm II acquired considerable English territory, and after a vigorous reign was succeeded in 1033 by his grandson Duncan, who six years later was killed by Macbeth. Macbeth was defeated and slain in 1056 or 1057, and was succeeded by Malcolm III, who invaded and ravaged the N. of England. In retaliation William the Conqueror invaded Scotland in 1072, and Malcolm submitted, and performed homage to William as his feudal superior for, as the English subsequently alleged, his whole kingdom, though the Scotch maintained that the homage was rendered only for the twelve manors which Malcolm held in England. The question led to a war between Malcolm and William Rufus, in which the Scottish king was slain (1093). Of his successors the most conspicuous were Alexander I, David I, Malcolm IV, William the Lion, Alexander II, and Alexander III. The reign of William the Lion (1165–1214) was memorable for his capture by Henry II of England, and his disgraceful treaty with that monarch in 1174, by which he agreed to become the vassal of Henry.

This state of dependence continued till the death of Henry in 1189, when Richard Cœur de Lion agreed for 10,000 marks to renounce all claim on the part of the English crown to supremacy over Scotland. William the Lion was succeeded by his son Alexander II, whose son Alexander III, dying in 1286, left the crown to an infant granddaughter, Margaret, daughter of Eric, King of Norway. On her voyage from Norway, Margaret died, and various competitors for the crown appeared, the principal of whom were John Balliol and Robert Bruce. Edward I of England offered or was invited to mediate between them, and awarded the crown to Balliol, on condition that he should do homage to him as his feudal superior. When called upon soon after to aid Edward against France, Balliol renounced his allegiance and declared war, upon which Scotland was overrun by an English army, and Balliol taken prisoner and sent to the Tower of London. Sir William Wallace of Ellerslie continued the contest until he was betrayed into the hands of Edward, who caused him to be cruelly executed at London (1305). The struggle was continued by Robert Bruce, grandson of the competitor of Balliol, and it culminated in the battle of Bannockburn, June 24, 1314, where the English under Edward II were routed. The younger Bruce ravaged the country so fearfully that in 1328 Edward III renounced his claim of sovereignty. Bruce died in 1329. In 1333 a fresh war broke out, and after the battles of Haledon and Neville's Cross (1346), the Scottish kings were compelled to acknowledge themselves vassals of England.

During the century which succeeded, the scepter was swayed by three kings, one of whom, Robert II (1371–90), son of the steward of Scotland, was the first sovereign of the house of Stuart. Most of the Stuarts were valiant and energetic men, but seven ascended the throne as minors, and five ended their lives by untimely deaths. This gave the power of the nobility an exorbitant development, and for centuries the history of Scotland became a contest between the crown and the nobility, and one con-

fused maze of feuds between the various noble families. In these troubles the kings sought support from the Church; they flattered and enriched it. The Scotch Church was the richest in Christendom. In the sixteenth century it owned half of all the real estate in the country. The nobility were jealous and afraid of the Church, and embraced the Reformation with eagerness; and the crisis in Scotch history in the sixteenth century was essentially a contest between Romanism and absolutism on the one side, and Protestantism and feudalism on the other—a contest in which the final decision was given by a third party, the middle class, the burghers, who, under the leadership of Knox, carried the Reformation through, and put limits to the power both of the crown and the nobility.

His successor was Robert III (1390–1406). His son James I, on a voyage to France in 1405, had been captured by the English, and was detained as a prisoner till 1424, when he began a brief reign of great energy. He was assassinated in 1437, and was succeeded by his son James II, who humbled the house of Douglas, took part in the civil wars of England on the side of Henry VI, and was killed while besieging Roxburgh in 1460. His son James III was engaged in civil war almost constantly after his accession against his brother, the Duke of Albany, who was defeated in 1483, and afterwards against his own son, who defeated him in 1488, and succeeded him as James IV.

In 1513 the latter invaded England, and was defeated and slain at Flodden Field, September 9th, together with so many chiefs, nobles, and common soldiers that all Scotland was plunged in mourning. A long series of misfortunes followed during the minority of his son James V. In 1542 James became involved in war with England, and died in the same year of a broken heart caused by the mutinous conduct of the nobles, which had led to a disgraceful defeat of his army at Solway Moss. The crown descended to his only child, Mary Stuart. On her death (1587), her son James VI, who had been crowned in 1567, while an infant, took possession of the government. Presbyterian Protestantism had, after violent struggles, become the religion of the country. James succeeded in 1603 to the throne of England. This event, which united the two nations under one head, closed the history of Scotland as a separate kingdom, though it was not till 1707 that the countries were legislatively united. Since the union the most remarkable occurrences in her annals have been the two rebellions of 1715 and 1745, to restore the exiled Stuarts.

Scotland, Church of, the established Church of Scotland, frequently since the Reformation called the Reformed Church of Scotland.

Abt. 563 A.D. St. Columba founded his monastery on the lone isle of Iona, and extended his missionary work all over Scotland, and even into England. In later centuries another stream of Christian influence was poured into Scotland from the S., representing the Roman form of ecclesiasticism. From the middle of the twelfth century till the dawn of the Reformation, the history of the Church in Scotland is one of constantly increasing power and wealth. In the beginning of the sixteenth century the writings of the continental Protestant divines were introduced into Scotland. Patrick Hamilton, a youth of high endowments, returned from Wittenberg in 1527, and began to preach the Reformed doctrines. He was tried for heresy and burned at the stake (1528). Persecutions followed for thirty years.

The accession of Elizabeth and the return of John Knox from Geneva greatly encouraged the reforming party, and in 1557 a great many of the chief reformers banded themselves together to coöperate for the interests of the reformed faith, and signed what is known as the First Covenant. In 1560 the Scottish Parliament adopted the Confession of Faith drawn up by John Knox, the jurisdiction of the pope was abolished, and Calvinistic Protestantism was established as the national religion. After the death of Knox the conflict between Presbyterianism and Episcopacy began. In 1578, when James VI assumed the government, a second Book of Discipline (still the law of the Church) was drawn up, and in 1580 Episcopacy was abolished by act of Parliament, and the National Covenant was made the test of orthodoxy.

The chief governing power in the Church was intrusted to a General Assembly, which met twice a year for twenty years, after which the meetings were annual; this body was composed of officials called superintendents, ministers, and lay commissioners. What has been considered the most essential characteristic of Presbyterian government—the Presbytery—was not yet introduced in its present form; but this took place before 1592, when the privileges of general and provincial assemblies, presbyteries, and parochial sessions were ratified by Parliament. On the accession of James to the throne of England his energies were devoted to the establishment of Episcopacy.

The measures of his son Charles I were equally unfavorable to the Scottish Church. On his attempting to introduce a liturgy the National Covenant was recast, and gladly subscribed by thousands of all ranks. An act of the General Assembly held at Glasgow in 1638 abolished the Five Articles of Perth, and Presbyterianism once more superseded Episcopacy. The Solemn League and Covenant of the three kingdoms, after having been approved of by the General Assembly of Scotland, was signed by the General Assembly of Divines at Westminster (which met in 1643), and by the Parliament itself. The Westminster Assembly drew up a Confession of Faith (completed in 1646), which was accepted by the Church of Scotland, ratified by the Scottish Parliament, and still is the recognized standard of the Presbyterian churches. The ascendency of the Independents put an end to the triumph of Presbyterianism, and the General Assembly, dissolved by Cromwell in 1653, did not sit again for thirty-five years. On the restoration of Charles II, Episcopacy was again established in Scotland, and about 400 ministers resigned their livings. During the following years occurred the great persecution of the Covenanters.

After the revolution of 1688 the General Assembly again met, the Westminster Confession of Faith was ratified, and the right of patrons to nominate to benefices was withdrawn. At the union of England and Scotland, in 1707, a special statute was passed which secured the Presbyterian form of church government in the latter country. In the year 1712 an act was passed by Parliament which restored to patrons their right of presentation to church livings. This statute created much discontent, and led to the secession of various bodies from the Established Church, the first of which (1733) was the communion headed by Ebenezer Erskine, which took the name of Associate Synod. This was followed in 1761 by another secession, the separating body taking the name of the Synod of Relief; and last and most important of all by the disruption of 1843, when the Established Church lost about half her ministers. (See FREE CHURCH OF SCOTLAND.) This obnoxious patronage act in 1874 was finally abolished.

Scotland Yard, locality off Whitehall, near Charing Cross, in London, so named because it was in olden days the London residence of Scotch kings and their ambassadors. Up to 1890 it was occupied as the headquarters of the London police. So "Scotland Yard" is popularly synonymous with the English police, and especially the detective force.

Scots Mon'ey, the money used in Scotland before her union with England. This money is one twelfth the value of sterling money.

Scots.	Sterling.		
	£	s.	d.
doyt, or penny	0	0	0⅓
bodle, or twopence	0	0	0⅔
plack, groat, or fourpence	0	0	1⅓
shilling	0	0	01
merk, or 13s. 4d. (two-thirds of a pound)	0	1	1⅓
pound	0	1	8

Scott, Dred. See DRED SCOTT CASE.

Scott, David, 1806–49; Scotch painter; b. Edinburgh; showed precocious talent for designing; visited Italy in 1832; was a member of the Royal Scottish Academy. Among his paintings are "Nimrod," "Sarpedon," "Wallace," "Mary, Queen of Scots, Receiving her Death Warrant," "Jane Shore Found Dead in the Street," "Achilles," "Orestes," "Paracelsus," and "Christ in the Garden."

Scott, Sir Walter, 1771–1832; Scottish author; b. Edinburgh. He was a younger son of a writer to the signet. He became lame as the result of a fever in infancy; was called to the Scottish bar in 1792. His earliest publications were metrical versions of Bürger's ballads (1796). In 1799 he translated Goethe's "Götz von Berlichingen." In 1799 he was appointed Sheriff Depute of Selkirkshire. In 1802–3 appeared his "Minstrelsy of the Scottish Border," and in 1804 his edition of "Sir Tristrem." "The Lay of the Last Minstrel" (1805) was received with delight, not only for its chivalric spirit, its "vivid richness of coloring," its pathos, beauty, grace, and airy freshness, but as giving the promise of original poetic fervor and power to which the kingdom had long been a stranger. In 1806 he was appointed to a principal clerkship of the Court of Session. He next produced a collection of "Ballads and Lyrical Pieces" (1806), and edited the works of Dryden. "Marmion," perhaps the strongest and boldest of his poems (1808), was followed in 1810 by "The Lady of the Lake," in some respects more pleasing than any. His succeeding poems, "The Vision of Don Roderick" (1811), "Rokeby" (1812), "The Bridal of Triermain" (1813), "The Lord of the Isles" (1814), are far inferior, though having occasional passages of great beauty. In 1814 he published anonymously his first novel, "Waverley," which excited intense admiration and curiosity.

In 1811 he purchased a small farm on the Tweed, to which he gave the name of Abbotsford, and which by successive purchases gradually expanded into a large domain. He now produced in rapid succession "Guy Mannering" (1815), "The Antiquary," "The Black Dwarf," and "Old Mortality" (1816), "Rob Roy" (1817), "The Heart of Mid-Lothian" (1818), "The Bride of Lammermoor," "A Legend of Montrose," and "Ivanhoe" (1819). This splendid series of novels, thrown off with an ease and rapidity without parallel, marks the high tide of his genius. Those which follow are on a lower level, but the abundance of the production was hardly diminished: "The Monastery" and "The Abbot" (1820), "Kenilworth" and "The Pirate" (1821), "The Fortunes of Nigel" (1822), "Peveril of the Peak," "Quentin Durward," and "St. Ronan's Well" (1823), "Redgauntlet" (1824), and "Tales of the Crusaders," comprising "The Betrothed" and "The Talisman" (1825). All but five of these, forming three series of "Tales of my Landlord," were "by the author of Waverley." In 1809 he edited the "State Papers and Letters of Sir Ralph Sadlier"; in 1809–12, "Lord Somers's Collection of Tracts" (thirteen volumes), and in 1814 the works of Swift in nineteen volumes. With the increase of his prosperity he kept state at Abbotsford like a wealthy country gentleman. His literary fame seems never to have disturbed his equanimity, and the baronetcy conferred upon him in 1820 was probably received with more satisfaction than the praises of the public.

In 1826 the failure of his publishers and his printers involved him in liabilities amounting to about £150,000. He refused the composition which his creditors offered him, and at the age of fifty-five set about the task of reimbursing them by his pen. In 1826 appeared "Woodstock," and in 1827, "Chronicles of the Canongate, First Series," and the "Life of Napoleon Bonaparte." In 1827 he declared himself to be the author of the "Waverley Novels." His remaining works are the "Chronicles of the Canongate, Second Series" (1828); "Tales of a Grandfather" (three series, 1827–29), devoted to Scottish history; "Anne of Geierstein" (1829), "The Doom of Devoirgoil" and "The Auchindrane Tragedy" (1830), a "History of Scotland" (two volumes, 1829–30), "Letters on

Demonology and Witchcraft" (1830); another series of "Tales of a Grandfather" (1830), on French history; and a fourth series of "Tales of my Landlord" (1831), containing "Count Robert of Paris" and "Castle Dangerous." In the winter of 1830–31 symptoms of paralysis developed. Abstinence from literary labor was enjoined, and in 1831 he sailed for Italy. After visiting Rome, Naples, and other cities, feeling that his strength was failing, he requested to be conveyed home. He reached Abbotsford, and soon relapsed into insensibility, in which state he died. He had paid upward of £100,000 of his debts, and after his death the claims of all his creditors were fully satisfied. One of the best pieces of biography ever written is the "Life of Scott" by his son-in-law, Lockhart.

Scott, Winfield, 1786–1866; American military officer; b. near Petersburg, Va.; was admitted to the bar, but entered the army as a captain, 1808. In 1809, for disrespectful allusion to his superior officer (Gen. Wilkinson), he was suspended by court-martial for one year. In 1812, as lieutenant colonel, he went to the Canada frontier; was taken prisoner at Queenstown; in 1813 was exchanged, and joined the army as adjutant general with the rank of colonel. He was severely hurt by an explosion in the attack on Fort George, but in the autumn commanded the advance in the descent of the St. Lawrence; July 3, 1814, he took part in the capture of Fort Erie. He distinguished himself at Chippewa and at Lundy's Lane, and at the latter battle was severely wounded after having had two horses shot under him. At the close of the war Scott was promoted to be major general. In 1832 he commanded the forces in Charleston during the nullification troubles. He served in the Seminole War, and afterwards in the Creek country.

In 1841 he became commander in chief of the U. S. army, and in 1847 was at the head of the army in Mexico. Assembling his troops at Lobos Island, a landing was effected (March 9th) at Vera Cruz, which surrendered, together with the castle of San Juan d'Ulloa. The battles leading to the entry of the City of Mexico (September 14th) practically ended the war. Declining the proffered presidency of the Mexican Republic, Scott, having been superseded by Gen. W. O. Butler, and a court of inquiry ordered in his case, arrived in New York, May, 1848. He was a candidate for nomination in the Whig Convention which nominated Taylor for the presidency. In 1852 he received the nomination from the Whig party, but was defeated by Franklin Pierce, though receiving a large popular vote. In 1855 the rank of lieutenant general by brevet was conferred upon him.

Though too infirm to undertake the conduct of the army in the Civil War, Gen. Scott threw the weight of his influence in favor of the Government, and in the exciting events preceding actual hostilities rendered important service. On November 1, 1861, he was retired. Died at West Point.

Scourge of God, name given to Attila (*q.v.*).

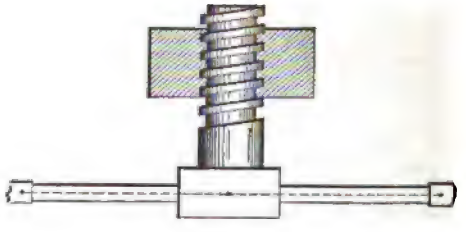
Scran'ton, capital Lackawanna Co., Pa.; on the Lackawanna River, 107 m. N. of Philadelphia. It has a picturesque location. The principal industries are the iron and steel works, although much of Scranton's prosperity is due to its being the distributing center for the large anthracite mining region. The city was founded by Joseph H. and George W. Scranton in 1840; was incorporated as a borough in 1854, and as a city in 1866. The first rolling mill was put into operation in 1844. Pop. (1910) est. at 129,867.

Scream'er, any bird of the family *Palamedeidæ*, related to the ducks, resembling the rails, and remarkable for their large feet. They

HORNED SCREAMER.

are so called from their harsh cry. They are all inhabitants of S. America, and frequent marshy ground.

Screw, a mechanism consisting of a cylinder having around it a projecting thread. Technically it is an inclined plane wrapped around a cylinder with its height parallel to the axis of the cylinder. One form, known as the external, convex, or male screw, is a cylinder of wood or metal surrounded with either a spiral groove or ridge, which makes equal angles with lines parallel to the axis of the cylinder; another, called the interior, concave, or female screw, is a hollow cylinder with grooves around



SCREW.

its interior fitted to the ridges of the corresponding solid screw. When very short, and used as a fastening upon the external screw, it is called a nut. The spiral ridges are called the thread. The definite advance of the ridge is the pitch of the screw. The action of the screw

is indefinitely extended and its power increased by adding to it a wheel and axle, so arranged that the teeth of the wheel engage in the threads of the screw and are brought round continually while the screw is made to turn in a fixed position against the wheel. This is known as the endless screw. Small screws, answering instead of nails, are known as wood screws.

The standard thread in Europe was developed by Sir Joseph Whitworth. The U. S. standard thread, or Franklin Institute standard, was laid down by William Sellers.

The screw has been applied to iron piles for forming a secure foundation in loose soil, to mooring chains for vessels, to the raising of heavy weights, to micrometers for microscopes and astronomical instruments ($\frac{1}{100000}$ in. can be measured with accuracy by a micrometer screw)—in fact, there is no mechanism so delicate or machinery so ponderous that is not dependent upon some application of the screw.

Screw Pines, the *Pandanaceæ*, a small family of about eighty species of mostly tropical, erect, or climbing monocotyledonous trees and shrubs. The species are confined to the Old World. They bear some resemblance to the palms, but their strongest affinities are with the aroids. Screw pines bear naked, diœcious, spiked flowers; the stamens are many; the ovaries are compound with many ovules, or (by reduction) simple with solitary or few ovules. They send out peculiar roots from various parts of the stem. The long spiny leaves, resembling those of a pineapple, are arranged in a spiral screw-like manner. Many species are cultivated in greenhouses.

Screw Propel'ler, a wheel with two or more inclined blades by the revolution of which a thrust is obtained for the propulsion of a ship. Four blades produce less vibration of the vessel than two, and most large vessels are fitted with twin screws, as this permits steering without a rudder and minimizes the seriousness of breakdowns. As many as six screws on separate shafts have been fitted to one vessel. Small screws are used with turbine engines on account of the rapidity of revolution, but screws over 20 ft. in diameter have been fitted to transatlantic liners. Screw propellers are made of cast iron, cast steel, or bronze, the latter being preferred on account of its noncorroding qualities. The principle of the screw propeller was used by the Chinese, and was described by Bernouilli. In 1801 John Stevens, an American, constructed a practicable screw vessel, and, under the direction of Ericsson, in 1842, the U. S. S. *Princeton* was launched—the first man-of-war to be fitted with a screw propeller, and before 1870 the paddle wheel gave way to the screw for general navigation.

Scribe (skrēb), **Augustin Eugène,** 1791–1861; French playwright; b. Paris; studied law; in 1811 his first play, "Les Dervis," failed; achieved his first success in 1816 with "Une Nuit de la Garde Nationale"; from 1816–20 wrote innumerable vaudevilles and small comedies with songs; wrote, 1820–30 about 150 plays, mostly one-act comedies of a sentimental or satirical character; and from 1830 to his death, more than 100 plays in three or five acts, historical, satirical, and even tragical, besides a similar number of opera librettos, and some novels and romances. Most of these plays he produced in collaboration, and at one time this artistic copartnership was organized in business style; one made the plot, another sketched the characters, a third wrote the dialogue, etc. In general, his success was complete. For nearly forty years he reigned supreme in all the theaters of the world. His plots have novelty and originality, their movements are adroit and rapid, and the dialogue has eloquence and piquancy; but his picture of character is superficial, and of passions and sentiments untrue; he lacks ideas, and is deficient in style.

Scribes, originally, officers of state who drew up the decrees of kings, wrote their letters, and kept records. Among the Israelites (Ex. v, 6–19, and Num. xi, 16) there were scribes to keep genealogical registers, serve processes, and the like. In Palestine they were chosen from the Levites (I Chron. xxiii, 4; II Chron. xix, 11; xxxiv, 13). From the time of Ezra (fifth century B.C.) they were the copyists and then expounders of the Law. In the New Testament they are generally named in connection with the Pharisees, as they belonged to that party, and were noted for their hypocrisy, ostentation, and arrogance.

Scrib'ner, Charles, 1821–1871; American publisher; b. New York; educated at New York Univ. and at Princeton, where he graduated, 1840; studied law for three years, and was admitted to the bar, but never practiced; began the business of book publishing, in New York, in partnership with Isaac D. Baker, in 1846, under the style of Baker & Scribner. In 1850 Mr. Baker died, and the business was then carried on in Mr. Scribner's name and in the name of his sons. The business was incorporated in 1904.

Scrip'tures, Ho'ly. See BIBLE; GOSPEL.

Scrof'ula, name formerly applied to the hereditary tendency to certain skin diseases and to chronic inflammations of the lymphatic glands. This condition is now regarded as due to local tuberculosis. See KING'S EVIL.

Scrophularia'ceæ. See FIGWORTS.

Scru'ple, in apothecaries' weight, one third of a drachm, 20 grains, the $\frac{1}{288}$th part of the pound troy. The Romans gave the name to the $\frac{1}{288}$th part of any standard unit of measure.

Scud'der, Horace Elisha, 1838–1902; American author; b. Boston. He was editor of *The Riverside Magazine*, 1867–71, and, 1890–98, editor of *The Atlantic Monthly*. He was the author of "Dream Children," "Stories from my Attic," "The Bodley Books," "Stories and Romances," "Life of Noah Webster," "Men and Letters," etc.

Scudéry, or **Scudéri** (skü-dā-rē'), **Madeleine de,** 1607–1701; French poet and novelist; b. Havre, France; became conspicuous figures in the literary circle of the Hôtel Rambouillet,

and acquired celebrity by her romances, "Ibrahim," "Artamene," "Ou le Grand Cyrus Clelie," "Alahide," etc., which are long discussions of sentiment and gallantry. After the reunions of the Hôtel Rambouillet had been broken up by the troubles of the Fronde, she formed a salon of her own, frequented by the queen and the princes.

Scul'pin, any fish belonging to the family *Cottidæ*; distinguished by a rather stout, club-shaped body and large head, the spines with which the head is armed, and a naked or simply rough body; the mouth is quite large. Sculpins are very destructive to other fishes, and are a nuisance to the angler. They are commonly found along the Atlantic seaboard of N. America, the best known being the most S. species, *Cottus octodecem-spinosus*, and the *C. grœnlandicus*, which is the most common N. of Cape Cod. The name deep-water sculpin, or sea raven, is applied to the *Hemitripterus acadianus*. On the Pacific coast the name is applied to corresponding species of the same genus. The species are rarely or never used as food except by the Greenlanders and the very poor.

Sculp'ture, the art of cutting or carving any substance into images, includes carving, modeling, and casting. The images may be either insulated figures, technically called the "round," or figures attached to a background from which they are raised, and designated, according to the degree of the "relief," as it is termed, alto-relievo, basso-relievo, and mezzo-relievo, or of figures which, without projecting from the face of the original ground, have their outlines sunk into it, and are rounded on the principle of basso-relievo. This last method occurs chiefly in Egyptian sculpture, and may be termed relieved intaglio.

For carving, porphyry, basalt, granite, marbles, alabaster, ivory, bone, and wood have been used from a remote period, the three first named being used by the Egyptians, while the Greeks worked chiefly in marble. The white Parian marble from the island of Pharos was most esteemed; next to it came that from Mts. Pentelicus and Hymettus. The finest Italian marble still comes from Carrara.

For modeling, clay, stucco, plaster, and wax were used, and images of baked clay (terra cotta work) were multiplied by means of molds of the same material, into which the soft clay was pressed. Terra cotta was used for a variety of purposes besides statuary, the objects formed from it being generally small and painted, and of a hardness, produced by the action of fire, almost equal to stone. The metals employed in casting are gold, silver, iron, tin, copper, lead, and their compounds. Electrum, formed of gold and silver, was used in the Homeric age, but the composition called bronze has always been preferred. Metal statues were not always cast, but in early ages, at least, were made of hammered plates fastened by rivets, a method adopted in the colossal statue of Liberty in New York harbor.

Michelangelo would begin upon the marble block with no model or guide before him, and work rapidly and furiously knocking off large chips. In modern sculpture, however, it is customary for the artist to make a full-sized model in wet clay, changing it, reconsidering it, sometimes throwing down the whole model and building it up again. From the model a plaster cast is made; and this is the artist's work, the statue or the bust which the French sculptor sends to the Salon. The sculptor may retouch his plaster cast, in which case it becomes the original work. When the plaster is to be copied in marble it is set beside the block, and a marble cutter makes a rough copy, aided by the pointing machine, which enables him to assure himself of the exactness of every measurement. A process much used during the Middle Ages was making the mold from an original model finished in wax upon a core of a coarser material. The mold was made upon this model in a single piece, its material being applied in coats, the first coats in a semiliquid state. The liquid bronze was poured into the mold, and between it and the core, melted the wax, and took its place; the mold, of course, had to be broken to pieces in order to remove the hollow bronze casting. This process, called *à cire perdue*, has been used in modern times, but commonly a piece mold allows of successive castings.

Greek sculpture was brought to perfection by the innate genius of the people, their religion, and their social and political institutions. The sculptures of the best period were almost exclusively public, and intended for the moral or religious improvement of the people, or as an incentive to noble deeds. When these motives ceased to predominate sculpture began to decline. Greek sculpture is divided into a semimythic or archaic period, a period of grandeur and power, and a period of refinement or physical beauty, and a period of decline. The stiffness of the archaic period are lost in the grandeur and ideal beauty of Phidias and his contemporaries, Hegias, Pythagoras of Rhegium, Calamis, Ageladas, Agoracritus and Alcamenes, Myron, and Polycletus, who are known mainly by their statues of gods and heroes, and their historical groups for the temples, porticoes, theaters, and gymnasia. Of these, Phidias, Myron, and Polycletus, all scholars of Ageladas of Argos, were the most famous, and their works exhibited the dignity and almost passionless tranquillity characteristic of a heroic age, and of the lofty purposes for which its artists labored. Phidias of Athens, associated with the noblest monuments and sculptures of the era of Pericles, is placed at the head of all the sculptors of antiquity for sublimity and severe beauty.

Polycletus, the head of the Argive school as Phidias was of that of Athens, rivaled him in every department of his art except the representation of gods, in which Phidias was never equaled. Polycletus's statues of athletes were considered the perfection of manly beauty, and a spear bearer was so accurately proportioned as to be a standing model. The prosperity and luxurious habits of the people developed a period of refinement or sensuous beauty, beginning abt. 400 B.C., during which Scopas, Praxiteles, and Lysippus flourished, and the art was brought almost to perfection in respect

THE APOLLO BELVEDERE.
THE VATICAN, ROME.

THE LAOCOÖN.— AGESANDER.
THE VATICAN, ROME.

THE VENUS OF MILO.
THE LOUVRE, PARIS.

THE DISCOBOLUS.— MYRON.
THE VATICAN, ROME.

THE FARNESE BULL.
THE NATIONAL MUSEUM, NAPLES.

THE AMAZON.— POLYCLETUS.
THE VATICAN, ROME.

THE MOSES.— MICHELANGELO.
ST. PETER'S, ROME.

THE WINGED VICTORY OF SAMOTHRACE.
THE LOUVRE, PARIS.

THE HERMES.— PRAXITELES.
MUSEUM OF OLYMPIA.

FAMOUS EXAMPLES OF SCULPTURE.

to gracefulness of form and expression and technic. Scopas excelled in single figures and groups, combining strength with grace; the group of Niobe and her children in the museum at Florence is attributed to him. The *Venus Victrix* of the Louvre, called the Venus of Milo, was also considered his work, but may be reasonably regarded as a remnant of the sublime style developed under Phidias.

About 320 B.C. the schools of Praxiteles and Lysippus were in considerable vigor, although the artists imitated their predecessors rather than opened original paths of design. Sculpture declined, its decay being hastened by the dismemberment of Alexander's empire. Until the middle of the third century B.C., however, there appears to have been no lack of reputable artists, and schools sprang up in Rhodes, Alexandria, Pergamus, Ephesus, and elsewhere, the followers of which often lent their talents to the execution of grossly flattering portraits of kings, and other unworthy purposes. Rhodes could boast of Chares, the sculptor of the colossus. To this period are attributed Agesander's Laocoön, the Apollo Belvedere, the Farnese Hercules, and the Dying Gladiator. With the reduction of Greece to a Roman province, art degenerated into handicraft. The Greeks transferred their labors in the first century B.C. to Italy. As early as 162 B.C., Rome possessed many statues of gods and public men by Greek sculptors. Julius Cæsar was an intelligent collector of statuary, and during the reign of Augustus the art was liberally encouraged. Trajan gave new life to the arts in Greece and Rome, and his reign and those of Hadrian and Antoninus Pius have been called the golden age of Italian sculpture. Roman sculpture was a continuation of that of Greece; the best artists were Greeks, and there is no record of the production of a work of merit by a native sculptor. With the Pisani in the thirteenth century the history of modern sculpture begins. They were followed by Orcagna, the Masucci, Ghiberti, and Donatello (died 1466).

At the beginning of the sixteenth century the most extraordinary character in the history of modern art produced his masterpieces of form. The works of Michelangelo Buonarroti are beyond comparison the grandest efforts of modern plastic art, and his colossal Moses, his statues of Lorenzo and Giuliano de' Medici, and *La Pietà* in St. Peter's show that the influences of the antique, which had been reawakened at the end of the fifteenth century, were unavailing to destroy his original conceptions. From his time the art gradually declined in Italy, until by the eighteenth century it had become merely ornamental, mechanical skill being more regarded than taste or originality. In the latter half of the century the efforts of Clement XIV and Pius VI, and Cardinal Albani, the publications of Winckelmann, and the unearthing of the treasures of Pompeii and Herculaneum, revived a love for the antique. Some of the early works of Canova reflect the true antique spirit; but he later cultivated a meretricious gracefulness of form, particularly in his female figures, with a frivolous and ignoble mannerism. The history of Italian sculpture may be considered to describe in general terms the progress of the art in modern times in other European nations. The chief masterpieces of ancient and modern art are still in that country. But nearly all modern sculpture is concentrated in Paris, and different influences at work there show themselves in such contrasting artists as Pradier (died 1852), d'Angers (died 1855), Carpeaux (died 1875), Auguste Rodin, and Jules Dalon.

Denmark has produced in Thorwaldsen an artist who coöperated with Canova in bringing back the severity and simplicity of antique art, and who at the same time had no lack of religious feeling. Until the nineteenth century the art was pursued in England principally by foreigners, and the first native sculptor of note was Flaxman, a man of pure ideal conceptions, whose works bear a striking affinity to the antique. His designs from Homer are among the most remarkable productions of modern art. Next in ability to him come Gibson, Thomas Woolner, and Sir J. Edgar Boehm. No sculptures worthy of the name were produced in the U. S. previous to the time of Greenough (1805–52). Thomas Crawford's equestrian monument to Washington in Richmond, Va., possesses more than ordinary merit. Powers, for many years a resident of Florence, acquired a reputation by his Greek Slave. John Rogers was noted as a designer of statuette groups. John Q. A. Ward and Augustus St. Gaudens should especially be named. See ART; FINE ARTS.

Scur'vy, or **Scorbu'tus,** a diseased state of the blood, induced chiefly by privation of fresh food. Its ravages were most disastrous at sea, devastating, previous to the nineteenth century, the navies and merchant marine of all nations. Pizarro's squadron included 2,700 men, of whom but 100 survived. Its symptoms are weakness, with painful swelling of the gums and the calves of the legs, with dysentery and jaundice. It is probably due to a changed chemical condition of the blood. At present scurvy is met in infants fed upon proprietary and predigested food instead of upon mother's milk.

Scu'tari, the largest suburb of Constantinople; situated on the Asiatic side of the Bosporus. Here the emperor Licinius was defeated by Constantine (323). It contains many mosques, palaces, and immense barracks. The vast cypress-shaded cemeteries are a striking feature. The hospital, memorable for the labors of Florence Nightingale, still exists. Pop. 80,000.

Scutari, town in Albania; on the S. extremity of the Lake of Scutari, 12 m. from the Adriatic. It was the stronghold of Gentius, last king of Illyricum, who surrendered here to the prætor Anicius (168 B.C.), and Illyricum became a Roman province. In 1477 for eight months it withstood a siege by 80,000 Ottomans, but in the treaty between Venice and the Porte it was ceded to the latter. It is the center of trade distribution through Albania. Pop. 36,000.

Scylla, or **Scilla** (sĭl'lă), a steep promontory on the Italian side of the Strait of Messina. In ancient mythology it was the home of the sea monster Scylla, who, along with the whirlpool Charybdis, threatened destruction to mariners.

Scythe (sĭth), a long, curved blade, sharp on the concave edge, used in cutting grass. It is attached, for use, to a curved handle, called a snath. Shorter and stronger scythes are used for cutting bushes, etc. The introduction of mowing machines has almost superseded scythes in hay making, but where the former cannot be employed scythes are still used.

Scyth'ia, ancient name for the vast regions which extend N., E., and S. of the Caspian Sea and the Sea of Aral. It was not used as a geographical term, for the boundaries of these regions were entirely undefined, but as a general term by which the Romans denoted a swarm of savage tribes living there, of whom they knew little.

Scythop'olis, the *Beth-shean* of Joshua xvii, 11, the *Beth-shan* of 1 Samuel xxxi, 10, now called BEISAN, the most important city of the Decapolis, and the only one W. of the Jordan, 4 m. from that river, and 14 m. S. of the Sea of Galilee. It was nearly as well watered as Damascus, four streams running through it. It was of great strength, its acropolis rising 300 ft. above the plain. The ruins, 3 m. in circuit, surpass all others in W. Palestine. Scythopolis was the seat of a bishopric in the fourth century A.D.

Sea. See OCEAN.

Sea Anem'one. See ACTINIIDÆ.

Sea Cow. See MANATEE and SIRENIA.

Sea Cu'cumber. See HOLOTHURIANS.

Sea Horse. See HIPPOCAMPUS.

Sea Is'lands, littoral band of islands of S. Carolina, especially from Winyah Bay to the mouth of the Savannah. Their fertility is extraordinary, their cotton celebrated, and their rice product large. They are low, and subject to overflow by storm waves. Those of 1893 and 1894 destroyed the crops, and caused thousands of deaths.

Seal, mammal of the families *Phocidæ* or *Otariidæ*, the eared seals being termed fur seals or sea bears and sea lions. With the exception of a species inhabiting Lake Baikal, seals are marine, but some find their way into the lakes of Newfoundland, and ascend rivers, a few having been taken even in Lakes Champlain and Ontario. They are more or less gregarious, especially during the breeding season, when they are found in herds on the ice floes. The female brings forth but one young, which is covered with a soft woolly coat, shed in two or three weeks. Seals feed on fish, but also eat cuttlefish, crustaceans, and molluscs. They are capable of remaining beneath the water for some minutes. Those species which winter in the ice keep a hole open to which they come to breathe; so hunters wait and spear the animal as it emerges, or else set a net over the hole.

The most familiar of the seals is the harbor seal (*Phoca vitulina*), common to both hemispheres, ranging from New York to Spain, along the N. shores of Europe and Asia, and down the Pacific coast of the U. S. to California. It attains a length of 5 or 6 ft. The

GREENLAND SEAL.

Caspian seal resembles the harbor seal, and is considered a descendant of that species, having entered the Caspian Sea when it was a branch of the Arctic Ocean, and become modified by isolation. The harbor seal is found on the coast in small bands. The largest of the seals (excepting the elephant seal and sea leopard) are the bearded seal and the gray seal, each of which attains 8 or 9 ft. The gray seal is found only in the N. Atlantic and the Baltic,

COMMON SEAL.

while the bearded seal is circumpolar. The gray seal is free from markings, while the bearded seal is blotched with brown or blackish. The netsick, or ringed seal is smaller, and has light markings in the form of rings surrounding oblong dark patches. It is prized by the Eskimo, as it forms an important article of food.

The hooded or bladder-nosed seal attains 7 or 8 ft., and the males possess the power of inflating the skin about the nose. It is usually incorrectly figured with the hood on top of the head. It is a N. species, and is not found in herds.

Seal, a piece of metal, stone, or other hard substance on which is engraved some image or device, and used for making impressions on wax or like material affixed to legal instruments, as evidence of their authenticity. The

word is applied also to the thing impressed. The word *bulla* is used to designate an impression in metal, and is the distinctive appellation of a class of instruments sealed in that way. Such, for example, are the edicts and briefs of the Roman pontiffs. The Byzantine emperors sealed in the form of *bullæ* with lead, and sometimes with silver and gold. The wax most anciently employed was white; various colors were introduced about the ninth or tenth century. Seals bearing armorial devices were not common until the thirteenth century. Lead, silver, or gold *bullæ* were appended by a cord or strip, and pendent seals are still used for letters patent, treaties, and important public documents. From the universal use of seals in England it came to be English law that no instrument of conveyance was a deed until it was sealed; and as no contract is obligatory without a consideration, the law presumed a consideration from the presence of the seal. A wafer or other tenacious substance, on which an impression may be made, is a good seal. In the U. S. a scroll or ring made with the pen in imitation of the seal, or as marking its place, is often sufficient.

Sea Lav'ender. See MARSH ROSEMARY.

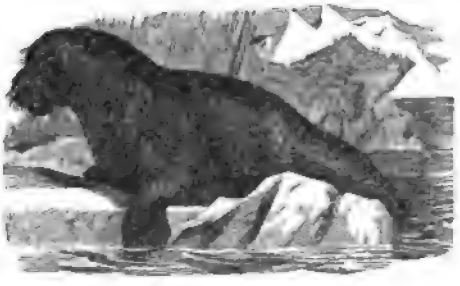
Sea Let'ter, or Sea Brief, a document required by the law of nations to be on board of every neutral ship as evidencing its title to neutrality. It specifies the nature of the cargo, the port whence it was shipped, and the port of its destination. It is analogous to the passport of an individual.

Seal Fish'eries, the capturing of seals for commercial purposes; said to have arisen toward the end of the eighteenth century; though the walrus had been hunted for at least two hundred years before, comparatively few hair or fur seals were taken prior to 1790. The principal hair-seal fishery is off Newfoundland and Labrador, the value of the seals taken there exceeding that of the catch elsewhere. Large numbers are taken in the Gulf of St. Lawrence, near Nova Zembla and Jan Mayen islands, in the White and Caspian seas, and on Kerguelen and Heard islands in the S. Pacific, as well as at other points in the Antarctic Ocean. The harp seal is, commercially, the most important of the hair seals, but the hooded seal, or bladder-nose, the square flipper, and the Caspian seal are all taken in great numbers.

In the most flourishing days of the seal fishery 8,000 to 10,000 men were engaged. In 1892 the Newfoundland sealers took 390,174 seals, the value of skins and oil being $865,784, but in 1893 the catch was only 129,061 seals. The annual product of the Norwegian fishery is about $300,000. The seals are taken on the floe ice, and the major part are the newly born young, which have never left the ice and are excessively fat. At present 1,000 to 1,500 skins is a fair season's catch, whereas 50,000, 60,000, or even 100,000 skins were formerly taken by a single vessel. The Pribilof and Commander islands, in Bering Sea, are the chief seats of the N. fur-seal fishery; in the S. the S. Shetlands and various small islands in the vicinity of Cape Horn, S. Georgia, the S. Orkneys, the Crozets, and Lobos islands are also visited. At the Commander and Pribilof islands, whence the main supply of fur-seal skins comes, the number of seals that may be taken is fixed by law, and none but the young males are killed. With these restrictions the fur seals might be preserved indefinitely, but the value of the skins has led to the pursuit of the animals at sea, where they are shot from small boats or speared. Owing to the fact that dead seals sink quickly, about seven are killed for every one secured. (See BERING SEA CONTROVERSY.) The catch at the Pribilofs has fallen from 100,000 to 7,500, or, in 1893, 16,000, while the pelagic sealers took not far from 50,000 skins. Only 13,000 were taken in 1910. In 1911, the U. S., Great Britain, Russia and Japan signed a treaty forbidding pelagic sealing for a period of fifteen years.

Seal'ing Wax, a resinous preparation used for securing folded papers and envelopes, and for receiving impressions of seals set to instruments. Ordinary red sealing wax is made of pure bleached lac, to which, when melted, are added Venice turpentine to promote fusibility and prevent brittleness, and vermilion as a coloring matter. Inferior qualities consist of a proportion of common rosin and red lead, and black and other colors are produced by substituting appropriate pigments. Sealing wax was invented in the seventeenth century, although in mediæval times a mixture of beeswax with turpentine and coloring matter was used.

Sea Li'on, a large seal of the *Otariidæ*, characterized by harsh hair without under fur, and the color is yellowish brown in the mature, but in the young reddish brown. Two species are found in the Bay of San Francisco. One (the eumetopia) attains 11 to 13



SEA LION.

ft., while the other (zalophus) is only 7 to 8 ft. The zalophus is the sea lion of the menageries and zoölogical gardens. It has a slender, doglike head and a "honking bark or howl," while the eumetopias has a thick muzzle and a deep bass growl and steady roar. The walrus is sometimes called sea lion.

Sea'man, in law, any person (usually excepting the master, chief officers, and pilot) employed or aiding in the navigation of vessels, ships, barges, etc. It was formerly required in Great Britain that a British ship must

have for its officers and crew only British subjects (except in certain emergencies), but now this is not necessary. In the U. S. the statutes require that the master of a vessel must be a citizen of the U. S. in order that the vessel may enjoy the benefits and privileges of a vessel of that country. Experience has shown that seamen as a class need more protection at the hands of the law than ordinary persons, largely because they are more under the control of others when employed. The regulations affording this protection differ in different countries, but the general intent of them all is to do away with disputes between master and seamen as to the terms of the contract of hiring; to interest the seaman in the success of the attempted voyage, by making their earnings depend upon its termination; and to secure obedience to orders.

In general, the master of every seagoing ship must enter into a formal written or printed contract (the *shipping articles*) with each seaman of his crew, and these articles must be signed before the proper shipping officer. They must state the nature and duration and port of termination of the voyage, the number and description of the crew and their employments, the wages each seaman is to receive, the capacity in which he is to serve, and the time at which he is to begin work; a scale of provisions to be furnished; regulations as to conduct and as to fines, short allowance of provisions, or other punishments for misconduct; and any stipulation as to advance or allotment of wages. Wages cannot be insured by seamen, nor are they subject to attachment in the courts. Seamen may forfeit their wages by desertion, absence without leave, neglecting and refusing without reasonable cause to join the vessel, willful disobedience or continued willful neglect of duty, willfully damaging the vessel, or embezzling or willfully damaging any of the stores or cargo, and by smuggling whereby loss or damage is occasioned to the master or owner. But upon the commission of an offense for which it is intended to prosecute or enforce a forfeiture, an entry of the offense must be made in the official log book and signed by the master and by the mate or one of the crew, and the reply of the offender, if still in the vessel, must likewise be entered and signed; which entries must be produced or proved in legal proceedings. Seamen must submit to the usual punishments lawful and agreed upon in the shipping articles, such as short allowance, being put in irons, etc.; but flogging has fallen into disuse, and in the U. S. has been abolished by statute.

Sea of Cor'tes. See CALIFORNIA, GULF OF.

Sea of Sod'om, or Sea of the Plain. See DEAD SEA.

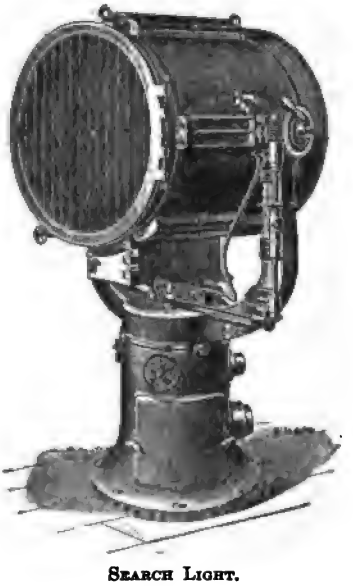
Sea Ra'ven. See SCULPIN.

Search and Sei'zure, the examination and taking into custody of one's person or property. The fourth amendment of the U. S. Constitution (*q.v.*) provides against unlawful searches. A similar provision exists in each state constitution. It is declaratory only of common-law principles, which decided that a general warrant to seize some person or papers not named was illegal, and declared a warrant to seize the papers of a person named to be equally illegal.

Some searches and seizures do not fall within the constitutional inhibition. They may be resorted to for the recovery of stolen goods, or in the case of excisable or dutiable articles, or in the case of things whose possession or sale is forbidden by law, or for levying an attachment or execution. But the warrant must name the place and the person or thing to be searched and seized.

A statute providing for the issuing of warrants by judges of insolvency on the complaint of an assignee to search for property of the debtor has been declared unconstitutional. The U. S. Supreme Court held a statute to be unconstitutional which authorized a court, in revenue cases, on motion of the Government's attorney, to require the defendant or claimant to produce in court his private books, invoices, and papers, or else the allegations of the attorney should be taken as confessed. The provision was deemed tantamount to a compulsory production of a man's private papers. The language of Lord Camden in the leading case of Entick *vs.* Carrington, decided 1765, expresses the true doctrine on searches and seizures, and the principles laid down in that opinion affect the very essence of constitutional liberty and security. They apply to all invasions on the part of the Government and its employees of the sanctity of a man's home and the privacies of life.

Search Light, an electric arc lamp in combination with mirrors or lenses so adjusted



SEARCH LIGHT.

as to project the light in a nearly cylindrical beam. Polished metal is used only for the cheaper kinds of search lights, because it is

a poorer reflector than silvered glass, and it tarnishes when exposed to sea air. There is a tendency to imply by the term search light an apparatus fitted with a metal mirror, and by projector one fitted with a mirror of silvered glass. The parabolic is preferred to the spherical mirror, as it has a shorter focal distance for the same diameter. The usual range for search lights is from 2,000 to 10,000 candle power. The diameter of the mirror may be from 8 to 30 in. The lamp may be moved slightly out of focus, thus giving a spreading beam for general illumination with less intensity. Against night torpedo-boat attacks search lights are important defensive equipments of war ships, as they render the torpedo boats visible at a distance of a mile or more, and thus expose them to attack from the rapid-fire battery. The motions of search lights are also utilized for signalling.

Sea Rob'in. See GURNARD.

Sea Ser'pent, a gigantic marine animal, said to have been seen in various localities, but never captured, and regarded by most zoölogists as mythical. The earliest references to it are in Norse literature, where frequent mention is made of the Sö-Orin. In 1555 the creature was described by Olaus Magnus in his "Historia Gentium Septentrionalium," where its length is set down as 200 ft. and girth 20 ft. In 1734 the Rev. Paul Egede gave a detailed description of a sea serpent which he saw during a voyage from Norway to Greenland, and in 1746 another was seen by Capt. Lawrence de Ferry, of Bergen, Norway, who made affidavit to the truth of his story.

From that time onward the sea serpent has been reported from various localities, but particularly on the coasts of Norway, Scotland, and New England. Many of these accounts are very circumstantial, and by people of unquestioned veracity. Perhaps the most noteworthy is that given by Capt. Peter M'Quhae, of H. M. S. *Dædalus*, on August 6, 1849, "an enormous serpent, with head and shoulders kept about 4 ft. constantly above the surface of the sea, and . . . there was at least 60 ft. of the animal *à fleur de l'eau*. . . . The diameter was about 15 or 16 in. behind the head, which was, without any doubt, that of a snake. . . . It had no fins, but something like the mane of a horse, washed about its back." Basking sharks, porpoises, floating logs, kelp, and seals have been considered the basis for other sea serpents.

A few scientific men are inclined to believe that there is some huge marine animal which has been seen, even going so far as to suppose the existence of some reptile, like the Plesiosaurus, or one of the immense reptiles whose remains occur in the Cretaceous.

Sea'shore (in law). It is laid down in the "Institutes" of Justinian that the seashore extends to the limit of the highest tide in time of storm or winter; but by the common law the seashore is the strip included between ordinary high and low water mark. By the civil law the sea was, like the air and running water, common to all, and not susceptible of private ownership. The common law took a different view. Owing to the splendid development of England's sea power and her assertion of civil as well as political jurisdiction over the "four seas" (the Atlantic Ocean, the Irish Sea, the German Ocean, and the British Channel), it became the accepted doctrine of English jurists in the seventeenth century that the bed of the ocean was the property of the crown so far as the royal jurisdiction extended. When this jurisdiction was cut down by modern international law to the three-mile limit the assumed property rights of the crown were reduced to the same dimensions. It is, however, a mooted question whether the property rights of the state are coextensive with this jurisdiction or whether they are bounded by low water mark, the latter view having lately come to prevail in Great Britain, while the former has usually been taken in the U. S.

The common-law rule is generally followed in the U. S., but in several states the property of the littoral proprietor extends to low water mark. In the U. S., moreover, it is the states and not the Federal Govt. in which the title to the seashore is vested. The principal public rights are those of navigation and of fishing, the taking of shellfish either from deep water or from the shore being included under the latter. There is, however, no right to take sand, gravel, or shells, nor to use the shore as a highway, nor for bathing. The littoral proprietor, whether owner of the shore or not, is under the doctrine of accretion entitled to the increase of his land by the gradual recession of the sea. If the retreat of the sea be sudden, however, or so rapid as to be perceptible in its progress, the land gained will belong to the state.

Sea'sickness, a nervous affection attended with nausea and convulsive vomiting, produced by the oscillations of a ship at sea. Its origin and nature are still very imperfectly known. It may attack the strong and cautious, while the debilitated and incautious go free. It may pass away after the lapse of a few hours, or last during a long voyage. Seasickness is probably due to circulatory disturbances in the nerve centers, possibly to a large extent induced by irregular visual impressions due to the rocking, or to disturbance of the balancing apparatus known as the labyrinth in the internal ear. In many persons a few mild doses of calomel before the voyage prevent the occurrence of seasickness. In others a little bromide of potash, soda water, or saline draughts suffice. Persons who are liable sometimes escape by preserving a horizontal position during the voyage.

Sea'sons, the periodic variations of heat and cold caused by the revolution of the earth around the sun combined with the inclination of its axis on the plane of revolution. If the axis of the earth were perpendicular on the plane of its orbit, the sun would always be opposite the equator. The days and nights being then of equal length on all parallels all the year round, the mean temperature on each parallel would be constant, and no seasons of heat and cold would exist.

But the axis being inclined 23½ degrees, an ever-varying inequality of days and nights and of temperature is the consequence. Only twice a year, on the 20th of March and the 22d of September, is the sun opposite the equator. It is then the time of the equinoxes and average temperature. On the 21st of June, the N. pole being inclined 23½ degrees toward the sun, the sun's rays fall perpendicular on the Tropic of Cancer, and the border of the lighted hemisphere reaches the opposite side of the Arctic Circle, 23½ degrees beyond the pole. This is the time of the solstice, or of the longest day and shortest night and of the highest sun in all the N. hemisphere. It is therefore the summer season, while the S. hemisphere has the shortest day, the longest night, the lowest sun, and the winter season. On the other solstice, the 21st of December, the reverse takes place. The difference in the length of days and nights increases very slowly in the tropical regions, then more and more rapidly to the Arctic Circle, where the longest day is twenty-four hours, and the sun does not set on the 21st of June. Beyond that limit to the pole the sun makes the circuit of the horizon without disappearing for months in succession, and at the pole the year is divided into one day and one night of six months each. The reverse again occurs in the opposite season. Thus in the tropical regions the temperature is nearly constant throughout the year, while the increasing inequality of days and nights toward the pole causes an increasing difference between the temperature of summer and winter.

The length of the days in the high latitudes compensates for the diminished intensity of the sun's rays, and so it happens that the accumulated heat of a long summer day in the temperate regions may be equal to or greater than that of a day in the tropical regions. A summer day of nearly nineteen hours in Labrador or St. Petersburg may be as warm as a day of twelve hours under the equator, but these N. latitudes have only a few such days in the year. Toward the equator the number of warm days gradually increases. Thus the polar regions have short summers and long winters, passing rapidly from one to the other with great differences of temperature. In the temperate regions summer and winter are about of equal length, with long transition seasons of spring and autumn and variable temperature. An everlasting summer reigns in tropical regions.

Sea Squirt. See ASCIDIA.

Seattle (sē-ăt'l), capital King Co., Wash.; on Puget Sound, 28 m. N. of Tacoma. Seattle, named after an Indian chief, was founded 1852. It early became the central commercial point for the Puget Sound region. The lumber trade has greatly developed the city, and the opening of the Alaskan gold fields made Seattle a distributing base for that country. Pop. (1910) 237,194.

Sea Ur'chins, or **Sea Eggs,** belong to the family of *Echinoderms*. The typical forms are flattened spheres, with the mouth at one pole and vent at the other. The outer wall is made up of ten rows of calcareous plates, one series being covered with spherical knobs, on which are articulated with a ball-and-socket joint the hardened spines which form a part of the animal, the other series being perforated by minute holes, through which pass the peculiar ambulacra or tube feet by which the animal moves. The jaws, large in proportion to the size of the animal, are composed of five pieces, which meet in the center and form a lantern-shaped structure, often called Aristotle's Lantern. A few of the echinoids, especially a European species, are used for food. Some of the tropical species have poisonous spines which, when they penetrate the flesh, produce severe wounds. See ECHINODERMS.

Sea'weeds. See ALGÆ.

Sebastian, Dom, 1554–78; King of Portugal; succeeded John III in 1557. In 1578 he sailed to Africa with a large fleet and 20,000 soldiers, to support Muley Mohammed, who had been deprived of the throne of Morocco by Muley Malek, his uncle. Having been joined by the forces of the former, he laid siege to Alcazar. Muley Malek attacked him, and after a desperate engagement Sebastian's army was routed and almost all killed or taken prisoners, and he himself disappeared. The Portuguese would not believe that their king had been killed, and many adventurers afterwards personated Sebastian, and gave rise to many poems and romances.

Sebas'tian, Saint, b. Narbonne, in Gaul, abt. 255; was a captain in the imperial guard when, under Diocletian, he was seized as a zealous Christian, bound to a tree, and used by the archers as a target. He did not die, but, having been brought to a Christian home and cured, he was seized a second time, trampled to death, and thrown into a sewer, abt. 287. His body was buried in the Catacombs. Pope Damascus (366–384) built a church over his tomb, relics of him were considered as powerful against the plague, and he was chosen as patron by archers or riflemen. He is generally represented as tied to a tree and pierced by an arrow.

Sebas'topol. See SEVASTOPOL.

Seces'sion, a withdrawal from a political or religious organization. The word is used to describe what was claimed to be the right of a state of the U. S. to withdraw from the Union. The way was prepared for this by the theory of nullification advanced by S. Carolina and in other states. The tariff of 1828 was declared by S. Carolina to be "null, void, and no law," and duties on imports were forbidden to be paid within its jurisdiction. Jackson, then President, by his energetic opposition and the message on nullification in 1833 put a stop to this political heresy for the time, but only postponed the day of final test. The doctrine was that every state has a right to interpret the Constitution for itself, and so interpreting to retire from the Union. The doctrine assumed practical form in 1860,

when it was claimed by the South that the triumph of the Republican Party meant the adoption of a policy of such interference with slavery as to make it impossible for the S. states to enjoy their constitutional rights. They accordingly attempted to withdraw from the Union by passing ordinances of secession.

Seck'endorf, family of German nobility, which can be traced back to the middle of the thirteenth century, and still flourishes in various branches. Several of its members have become celebrated: (1) VEIT LUDWIG, 1626–92; statesman and author; b. near Erlangen; held various important court positions; was the author of "Der deutsche Fürstenstaat" and "Commentarius historicus et apologeticus de Lutheranismo" (1692), famous books in their time. (2) FRIEDRICH HEINRICH, Count von Seckendorf, 1673–1763; soldier and diplomatist; nephew of the preceding; b. Krönigsberg; served in the Austrian army against the Turks, and in the War of the Spanish Succession took part in the negotiations which resulted in the Peace of Utrecht (1713). As Austrian ambassador to several German courts he worked to secure the recognition of the Pragmatic Sanction. In the War of the Polish Succession he commanded 30,000 men, and defeated the French at Klausen (1735) After the death of Prince Eugene (1736) he was commander in chief of the Austrian army against the Turks, but was defeated, accused of treason, imprisoned in the fortress of Gratz, and liberated only after much difficulty. He then entered the service of Charles II of Bavaria; commanded his army with success; expelled the Austrians from Bavaria. In the nineteenth century several members have acquired a name as poets: (3) LEO, 1773–1809; (4) KARL SIEGMUND, 1744–85, translator of Camoëns; (5) CHRISTIAN ADOLF, 1767–1833; (6) GUSTAV ANTON, 1785–1823, known also in the U. S. as a lecturer under the name of Patrick Peale.

Sec'ond Ad'vent, the reappearance of Christ in the world since His ascension to heaven. Christ Himself repeatedly promised so to return, and, next to the Messiahship, the second advent has been called the first Christian doctrine. In the Gospels Christ seems to identify His coming with the fall of Jerusalem; but Revelations describes the second advent as separated by an earthly reign of one thousand years from the last judgment and reconstitution of all things.

Second Ad'ventists. See ADVENTISTS.

Sec'ondary Era, a division of geologic time coördinate with Primary, Tertiary, and Quaternary eras. A synonym in more general use is Mesozoic Era.

Sec'retary Bird, or **Ser'pent Ea'ter,** a bird of prey (*Gypogeranus serpentarius*), which owes its name to a crest of feathers at the back of the head which suggests a pen tucked behind the ear. It feeds on rats and snakes, even on the venomous species, grasping them with its long legs and using its outstretched wing as a shield on which to receive the fangs of its

SECRETARY BIRD.

prey. It is found throughout S. Africa, W. of lat. 15°, and in Cape Colony is protected by law.

Secre'tion, the separation of certain elements of the blood, and their elaboration to form special fluids, termed secretions and excretions: secretions performing some positive function, as aiding digestion; excretions subserving the same purpose negatively by freeing the system of effete matter which if detained in the blood develops disease, as in jaundice. The function of the perspiratory and sebaceous glands is secretory, so far as they preserve the moisture and delicacy of the skin, but is chiefly excretory, eliminating water and various effete matters from the system, and hence is classed as an excretion. Bile is defined as a secretion, an excretion, and as both, its constituents being effete substances deleterious to health if not excreted, yet performing an important part in intestinal digestion.

Secretions may be formed of fluid which filters directly through the flat endothelial lining cells from the blood vessels, as in the sacs round the lungs and heart. A more typical secretory structure is the *tubule*, a cylindrical tube lined with secreting cells. Secreting surfaces, as the stomach and bowels, have many hundreds or thousands of such tubules to the square inch. Secretion is the product of cell activity. The cell derives its material from the blood, its stimulus to action from the nervous system, and it elaborates a peculiar fluid, in each instance predetermined by the inherent function of the gland or organ of which it is an integral part. Secreted fluids are homogeneous, consisting chiefly of water with variable quantities of salts and fatty matter, and in each case a distinguishing component, as pepsin in gastric juice and mucin in mucus.

Se'cret Ser'vice, U. S., a division of the treasury department, primarily organized to stop counterfeiting, but its operations have extended to the frustration of spies and the discovery of various offenses against the revenue

and other federal laws. Agents of this division are detailed to protect the person of the President and distinguished foreign visitors. The post-office department has a similar service conducted by its inspectors to prevent interference with or improper use of the mails.

Sec'ular Games, in Roman history, games celebrated at long and irregular intervals, in honor of the infernal gods, Pluto and Proserpine, to avert from the state some great calamity. Under the republic they were known as the Tarentine games, from a place in the Campus Martius, called Tarentum, where they were celebrated. First celebrated in 249 B.C., down to the time of Augustus they were held but three times; he revived them in 17 B.C. with considerable pomp. For this occasion Horace wrote his "Carmen Sæculare."

Sec'ularism, an ethical and social movement organized in England in 1844. Its most prominent leader during its earlier stages was George Jacob Holyoake, who for several years was president of the London Secular Society. He was succeeded in 1858 by Charles Bradlaugh, who, when the Secularists formed a national society, became its president, and the movement became more aggressively antitheological.

The idea of Holyoake was that ethical and social good is "the chief end of man," and that this end is not helped, but rather hindered, by theological and especially supernaturalist considerations relating to God and a future life. The National Society of Secularists declares the promotion of human improvement and happiness to be the highest duty; that theological teachings are obstructive of the same; that every individual should be well placed and instructed and usefully employed for his own and the general good; that civil liberty and religious liberty are necessary and that every Secularist is bound to actively attack all barriers to equal freedom of thought and utterance for all upon political and theological subjects. The same declaration of principles sets forth its objects: Secular education, disestablishment and disendowment of the state church, improvement of the condition of agricultural laborers, such change in the land laws as will give the laborer an interest in the soil, abolition of the House of Lords and substitution of a national senate with life members, investigation of the causes of poverty. On several of these lines the society has done excellent service. The opposition to the state church has been more economical than theological.

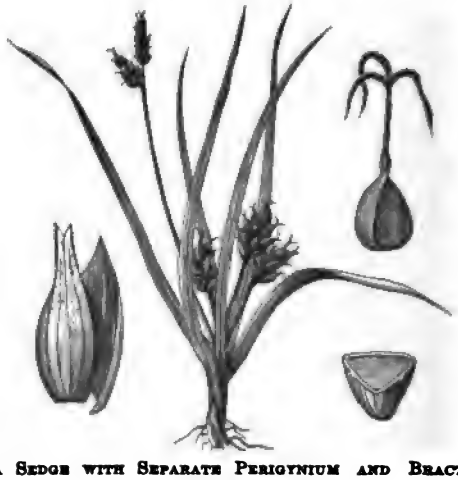
Seculariza'tion, the process of converting objects from a religious or spiritual to a common or secular use, and of removing matters from ecclesiastical control to the civil jurisdiction. Vast quantities of lands accumulated in the hands of the religious houses, and all the most valuable estates of Europe were likely to fall into their ownership. The first impulse of this movement was against the threatened monopoly of land, and this policy has continued to the present day. The accumulated possessions of the ecclesiastics and the spiritual houses have also been seized by the civil authorities and appropriated to secular uses, as in England under Henry VIII, in Scotland at the Reformation, and in France during the revolution. The Italian and the Mexican governments in the nineteenth century pursued a similar policy. Marriage has been made wholly a civil contract and status, divorce is regulated by statute, and both are under the jurisdiction of civil tribunals. The same steps had before been taken in reference to successions. So far as education is public, modern legislation favors a control by the state, and not by the Church. In the U. S., the theory of secularization has had the fullest scope, and has been worked out most thoroughly and consistently, and the removal of all distinctively religious instruction from the common schools, with the consequent secularizing of the public educational system, and the repeal of all laws which exempt ecclesiastical property from taxation are strongly advocated.

Seda'lia, capital Pettis Co., Mo.; 95 m. E. of Kansas City; laid out, 1861; was a U. S. military post, 1861–65. It is an important railroad center, and is surrounded by a fine farming district. There are car and engine shops and several factories. Pop. (1910) 17,822.

Sedan', town, department Ardennes, France; on the Meuse, 64 m. NE. of Rheims. It has manufactures of woolens. September 2, 1870, Napoleon III and his army of 86,000 surrendered here to the King of Prussia. In the World War U. S. forces seized the German line of retreat, and, to the great joy of the French, occupied the town, Nov. 6, 1918, five days before the signing of the armistice. Pop. about 19,350.

Sed'atives, medicinal agents which soothe or numb the senses or diminish activity. Local sedatives, like cocaine, diminish the sensibility of the skin; general sedatives are either hypnotics, like choral, or narcotics like opium, or alcohol, which induce sleep.

Sedge, plants of the *Cyperaceæ*, or sedge family, and especially the genus *Carex*, of



A Sedge with Separate Perigynium and Bract
Pistil and Section of Ovary.

which there are about 200 species in N. America; they are found in abundance in wet places

(though some are met with only in dry localities and on the tops of mountains), where they form a large portion of the vegetation, and are often mistaken for grasses, from which they differ in important particulars. In some the stems are weak and threadlike, and in others wiry and rigid, usually solid and three-angled; they for the most part flower early in spring, and perfect their fruit during the summer. There are in all about 1,000 species, which are more abundant in Arctic and cold countries, and diminish toward the tropics, where they are found only in the mountainous portions. They are of little direct value to man; they are dry and harsh, and contain very little sugar or starch; their chief office is to furnish mold for the sustenance of other plants.

Sedge'moor, a wild region of Somerset, England, extending SE. from Bridgewater. July 6, 1685, the Duke of Monmouth, son of Charles II by Lucy Walters, was defeated here by the army of James II, under the Earl of Faversham. The duke was taken prisoner, and executed July 15, 1685.

Sedg'wick, Catharine Maria, 1789–1867; American author; b. at Stockbridge, Mass.; undertook the management of a private school, and continued in that employment fifty years. She published "A New England Tale," in 1822, the success of which decided her to continue the career of authorship; brought out "Redwood," which was reprinted in England, translated into French, and elsewhere, and was the author of other popular works, including "The Traveler," "Hope Leslie, or Early Times in Massachusetts," reputed her best work; "Clarence," "The Linwoods," "The Poor Rich Man and the Rich Poor Man," "Live and Let Live," "Means and Ends, or Self-Training," "Stories for Young Persons," "Letters from Abroad to Kindred at Home," "Morals and Manners," "Facts and Fancies," "Married or Single?" and "Letters to my Pupils."

Sedgwick, John, 1813–64; American military officer; b. Cornwall, Conn.; graduated at West Point, 1837; served in the war with Mexico; in 1861 was made brigadier general of volunteers. His Civil War record was distinguished; he commanded a division at Antietam, where he was severely wounded three times and disabled until December. In command of the Sixth Corps, February, 1863, he occupied Fredericksburg, May 3d, and stormed Marye's Heights. His advance to join the main army at Chancellorsville was checked at Salem Heights on May 4th, and only by great skill and hard fighting was he able to hold his ground during the next day, withdrawing after dark across the Rappahannock. In the Pennsylvania campaign of 1863, the Sixth Corps formed the right wing of the army following the movements of Lee, and on the evening of June 30th encamped at Manchester, upward of thirty-five miles from Gettysburg. The events of July 1st demanded the hasty concentration of the army, and before 2 P.M. of July 2d Sedgwick had his corps in the field, having made the march of thirty-five miles in twenty hours. At Rappahannock Station (November 7th), he commanded the right wing, composed of the Fifth and Sixth corps, as in the "Mine Run move" (November 26th–December 3d). He was conspicuous in the Wilderness, as at Spottsylvania (May 9th), where he was killed by a sharpshooter while directing the placing of some artillery.

Sedimen'tary Rocks. See GEOLOGY.

Sedi'tion Acts. See ALIEN and SEDITION ACTS.

Seduc'tion, obtaining the consent of a previously chaste female to illegal sexual intercourse, as distinguished from rape, in which no such consent is obtained. Formerly, damages for seduction of a daughter could be recovered by the parent on the ground that he was thereby deprived of the daughter's service. But the idea of service is now little more than a fiction, and by statute the woman herself can maintain an action, the injury being based, not upon loss of service, but upon disgrace and suffering of mind. Seduction in some states is a felony, and below a certain age (called the age of consent) the statute presumes the female incapable of the discretion necessary for consent.

Seeds, the immediate result of sexual propagation in phanerogamous plants, being the ovules after fertilization and the consequent formation of the embryo, which is the germ of a new individual. A seed consists of the embryo; of the matured coats of the ovule, commonly two, of which the outer, and generally the firmer, is technically called the testa, the inner, tegmen; and often of a stock of nourishing matter accumulated around or accompanying the embryo. Its most important structural characteristic is the number of cotyledons or seed leaves—one in monocotyledonous or endogenous plants; two in the dicotyledonous or exogenous. Seeds develop many appendages to facilitate their distribution, either by being carried through the air, by burrlike attachments to animals, or by being eaten and passing through the alimentary tract—without loss of germinating power.

There are many conflicting accounts as to the vitality in seeds. The story of grain found buried with Egyptian mummies having germinated after being exhumed is discredited. All recent attempts under proper observation and precautions have failed, although there is no doubt that buried seeds have germinated after a lapse of fifty years. The best authenticated case, pointing to a much longer preservation of vitality, is that of the growth of raspberry seeds found in the abdominal portion of a skeleton exhumed from a Roman tomb near Dorchester, England; but it is one not beyond doubt and uncertainty. Experiments indicate a rapid extinction of vitality under ordinary conditions. Out of 338 species, representing 74 families of plants, only 94 kinds grew after 3 years, only 57 after 4 to 8 years, 16 from 8 to 21 years, 5 from 25 to 27 years, 3 to 43 years. Nearly uniform temperature, darkness, and either dryness or burial beyond atmospheric influences, most favor the prolongation of vitality. See GERMINATION.

See'land, the largest of the Danish islands; between the Cattegat and the Baltic, and between the Sound which separates it from Sweden and the Great Belt which separates it from the island of Funen. On it is Copenhagen, the capital; area, 2,713 sq. m. The ground is low and undulating, dotted with small lakes and studded with forests of oak and beech. The soil is very fertile, and well cultivated. Pop. (1901) 960,053.

Seg'ner's Wheel. See BARKER'S MILL.

Sego'via, capital of province of Segovia, Spain; on the Eresma; 32 m. NNW. of Madrid. Its streets are narrow and crooked, but many of its buildings are magnificent. Its aqueduct is built of granite blocks, without cement or mortar, and is the grandest specimen of Roman architecture in Spain. There are some manufactures of cloth, paper, and pottery. Pop. (1900) 14,658. The province of Segovia is part of Old Castile, and most of it is plateau; area, 2,714 sq. m.; pop. (1900) 159,243.

Ségur (sā-gür'), noble French family, many of whose members have been prominent in war, literature, and politics. The most distinguished are: LOUIS PHILIPPE, Count de Ségur, 1753–1830; b. Paris; served in America under Rochambeau; was in 1783 ambassador to St. Petersburg, where he gained the favor of Catharine II; retired during the Reign of Terror, and devoted himself to literary work; recalled by Napoleon. His principal works are "Théâtre de l'Hermitage" (1798), "Tableau Historique et Politique de l'Europe de 1786–96," "Mémoires." His son, PAUL PHILIPPE, 1780–1873; b. Paris; entered the army, 1799; became a member of the staff in 1802; aid-de-camp to Napoleon during the Russian campaign; after the second Restoration he retired to private life. In 1824 he published "Histoire de Napoléon et de la Grande Armée pendant l'Année 1812," which made a great sensation.

Seiche (sāsh), a peculiar oscillatory motion of the waters of lakes, supposed to be due to changes of barometric pressure. In the Lake of Geneva it varies from a few inches to several feet. At the time of the great Lisbon earthquake a similar perturbation was observed in Loch Lomond, Scotland.

Seidl (zī'd'l), **Anton H.,** 1850–98; German-American conductor; b. Budapest. He assisted Wagner in making the first score of the "Nibelungen," and from its production in 1876 till 1885 was well known in Europe as a Wagner conductor. In 1885, was called to New York to conduct the German opera. In 1891 he was elected conductor of the Philharmonic Society.

Seidlitz (sĕd'lĭts) **Pow'der** (*Pulvis effervescens compositus* of the *U. S. Pharmacopœia*) consists of 2 drams of the Rochelle salt and 40 grains of sodium bicarbonate, put up in a blue paper, and 35 grains of tartaric acid, put up in a white paper. The contents of the two papers are to be separately dissolved in about 2 fluid ounces of water, and the solutions mixed and drunk during their effervescence. It is employed as a purgative.

Seign'iorage. Free coinage exists where any man can take bullion to the mint and have it made into coin, either gratuitously or with a deduction not to exceed the actual expenses of coinage. Both Great Britain and the U. S. have free coinage of gold; but in Great Britain it is gratuitous, while in the U. S. it is not. Any deduction in excess of the actual cost of coinage is known as seigniorage. The objects of seigniorage are many—sometimes to debase the coin for the sake of the fiscal exigencies of the government; sometimes to secure money like the fractional coins which shall be secure from the danger of being melted down for exports or for use in the arts. In all cases of this kind the government makes an apparent profit on the issue of all such coins; but, if this is carried far, especially in the "legal-tender" coins which anyone must receive in payment of all debts, it is subject to great danger.

Seine (sān), the *Sequana* of Cæsar, river of France; rises in the department of Côte-d'Or, passes through Paris, and enters the English Channel at Havre; its length is 482 m. Also the name of a department of France; area, 185 sq. m. It is the smallest but the most densely peopled and wealthiest department of France, comprising Paris and the villages of Boulogne, Clichy, Puteaux, etc. It is traversed by the Seine and the Marne. The soil is not naturally fertile, but it has been made very productive by the skill of the farmers and gardeners. Pop. (1906) 3,848,618.

Seine-et-Marne (-ā-märn'), department of France; area, 2,214 sq. m. The ground is undulating and fertile. Extensive forests are found, among which is that of Fontainebleau. Pop. (1906) 361,939; capital, Melun.

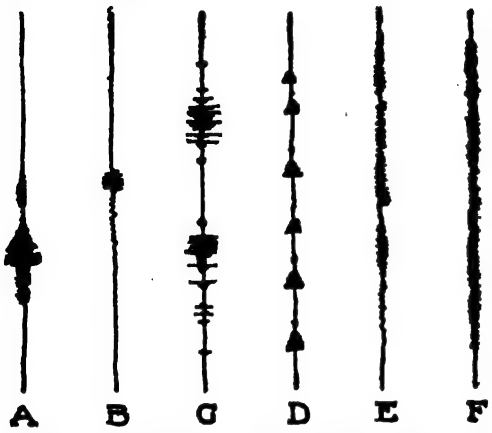
Seine-et-Oise (-wāz'), department of France; area, 2,163 sq. m. The soil is generally not fertile, but, being well cultivated, yields large crops. Several fine varieties of stone and clay are found, and the porcelain of Sèvres is renowned. Pop. (1906) 749,753; capital, Versailles.

Seine-Inférieure (-ăn-fā-rē-ér'), department of France, on the English Channel; area, 2,448 sq. m. The soil is fertile, forests abound, large crops of fruits are raised, and much dairy produce exported. Pop. (1906) 863,879; capital, Rouen.

Seisin (sē'zĭn), in law, possession of a freehold estate. Under the feudal system possession of lands was delivered by the lord to his vassal by the public act of investiture, which took place upon the land itself in the presence of witnesses, and originally by mere personal act, without writing. Later a charter of feoffment was made and delivered at the time, giving the estate, or, as it was called, of livery of seisin.

Seis'mograph, Seismom'eter, and **Seis'moscope,** instruments recording the motions of a point on the earth's surface during an earthquake. Seismoscopes merely detect and record an earth tremor, with or without indication of its time; seismometers measure also the maximum force of the shock, with or without in-

dication of its direction; seismographs record the number, succession, direction, amplitude, and period of successive oscillations. Most seismoscopes involve a delicately adjusted trigger whose movement permits a weight to fall, or stops a clock. In seismometers a heavy liquid is agitated, or a movable solid is dis-



MOVEMENTS REGISTERED UPON A SEISMOGRAPH BY: *A*, earthquake; *B*, persons passing in the street; *C*, passing artillery; *D*, cannon shots; *E*, strong wind; *F*, neighboring machine in operation.

placed. In seismographs the endeavor is to suspend a heavy body in such way that when its position is disturbed through a small distance no force will be developed tending to restore its original position; or, so that if its support be moved, the motion will not be communicated to the body. This result can only be approximated. The more elaborate machines record motion in the vertical direction and in two horizontal directions. See EARTHQUAKES.

Seiz'ure. See SEARCH AND SEIZURE.

Seja'nus, Ælius, d. 31 A.D.; a Roman courtier, son of a Roman knight, b. Vulsinii, Etruria; noted as a favorite of Tiberius. He was commander of the prætorian bands, acquired the confidence of Tiberius, and aimed at the supreme power. He contrived to remove all the members of the imperial family who stood between him and power, but having awakened the suspicion of Tiberius he was executed.

Sel'den, John, 1584–1654; English author. He was a barrister, and known as "the great dictator of learning of the English nation." He was a member of Parliament, sided with it against the king, and was imprisoned for sedition, 1629–34, because he had opposed the crown on the question of tonnage and ship money. He afterwards held several offices, but during the civil war withdrew from public life. His works include "England's Epinomis," "Jani Anglorum Facies Altera," and "The Duel or Single Combat," law treatises; "Titles of Honor," "Analecton Anglo-Britannicon," "De Diis Syris" (1617), a work on Syrian mythology which supplied Milton with some material for "Paradise Lost"; "History of Tithes," and "Mare Clausum," defending the sovereignty of England over the "narrow seas," in answer to the "Mare Liberum" of Grotius (1635). He is now best known by his "Table Talk."

Sele'ne, in Grecian mythology, the moon goddess, daughter of Hyperion and Theia, sister of Helius and Eos; also called Phœbe, as the sister of Phœbus, the sun god, and later identified with Artemis. Her chariot is drawn across the heavens by white horses, mules, or cows, which latter bore in the shape of their horns the symbol of Selene, the crescent moon.

Sele'nium, a rare element. Certain iron pyrites contain selenium, and, when these are used for making sulphuric acid, a seleniferous deposit forms in the leaden chambers, in which the element was discovered by Berzelius, 1817. Selenium is chemically related to sulphur, but it does not kindle easily; though, when heated strongly, it will burn in the air. An odor accompanies this combustion, compared by some to horseradish, by which the presence of selenium in a mineral can be detected. Seleniureted hydrogen, corresponding to sulphureted hydrogen, is a permanent gas, formed by the action of an acid on selinide of potassium or by heating selenium in a current of dry hydrogen. It is very poisonous, producing catarrh and loss of smell. Selenic acid, H_2SeO_4, corresponds to sulphuric acid.

The electrical conductivity of selenium is influenced to a remarkable degree by heat and light. Amorphous selenium does not conduct electricity, but the crystallized does so, and the conductivity increases rapidly with a rise in temperature. This relation has been utilized in the photophone, by which pictures are transmitted by electricity over a wire, but the idea has not been commercially developed.

Seleucia (sĕl-ū'sĭ-ă), the name of numerous ancient cities of Asia, two of which were: (1) SELEUCIA ON THE TIGRIS, founded by Seleucus I of Syria, on the right bank of that river, a little S. of the modern city of Bagdad. It rapidly rose in wealth and splendor, eclipsing Babylon, until it was in its turn eclipsed by Ctesiphon, built by the Parthians on the opposite bank. During the Parthian wars it was burned by Trajan and Lucius Aurelius Verus, and captured by Septimius Severus; and in Julian's Persian campaign in the fourth century it was found deserted. (2) SELEUCIA PIERIA, a fortress of N. Syria, founded by Seleucus I at the foot of Mount Pieria simultaneously with Antioch, of which it was the seaport. In the later period of the Syrian Kingdom it became independent. Under the Romans it decayed. Its ruins are still to be seen.

Seleu'cidæ, one of the five great dynasties of Persia before the Mohammedan conquest. After the death of Alexander the Great (323 B.C.) the empire fell apart, and Syria became one of the recognized ruling powers under Seleucus Nicator (ruled 312–281 B.C.), one of Alexander's generals. He was succeeded by his son Antiochus I. Soter (280–261 B.C.), and the latter in his turn by a son, Antiochus II, Theos

(261–246 B.C.). Under the first Seleucids the Greek sovereignty over Persia was preserved intact for nearly seventy years; its unity, however, was broken abt. 256 B.C. by the revolt of Bactria, and, 250 B.C., by the rise of Parthia under Arsaces. The Seleucid supremacy ceased in Iran abt. 150 B.C., at the time of Mithridates the Great.

Seleu'cus I, Nicator, abt. 358–280 B.C.; founder of the Syrian monarchy; b. in Macedonia. He accompanied Alexander the Great in his Asiatic expedition, and after his death adhered to Perdiccas, but soon headed his assassins at Pelusium (321). On the second division of the empire he received Babylonia, and joined Antigonus; but later fled before him to Egypt, and formed a league against him with Ptolemy, Lysimachus, and Cassander. He recovered Babylonia in 312. In 306 he assumed the title of king, and in 302 joined the new league against Antigonus, on whose death at Ipsus in 301 he obtained almost all the Asiatic territory conquered by the Greeks. His empire extended over 1,000,000 sq. m., from Phrygia to India. His aim, contrary to that of Alexander, was to Hellenize the Orient. He founded Seleucia on the Tigris, and made it his capital, but after the battle of Ipsus removed to Antioch. The change offended his Asiatic peoples. The dissatisfaction increased when he divided the empire into seventy-two satrapies, setting over each a Macedonian or Greek. He allied himself with Demetrius Poliorcetes, the son of Antigonus, whose daughter Stratonice he married; but in 288 he joined the alliance against him, and occupied most of his Asiatic dominions. He afterwards made war on Lysimachus, and routed and slew him on the plain of Corus in Phrygia in 821. He now determined to annex Macedonia, and crossed the Hellespont with a large army, but was assassinated at Lysimachia by Ptolemy Ceraunus.

Self-deny'ing Or'dinance, resolution passed by the British Parliament, 1645, at the instance of Cromwell decreeing that no member of Parliament should hold a commission in the army. Less efficient and lukewarm generals were—as Manchester, Essex, and Waller—thus gotten rid of in as delicate a way as possible, while Cromwell was reappointed lieutenant general of cavalry. The radical independents thus won the upper hand of the Presbyterians.

Se'lim, the name of three Ottoman sultans, who follow: SELIM I, YAVUZ ("the Inflexible"), 1467–1521. Usurped the throne, deposing and killing his father Bayezid II, with all his brothers and kinsmen. Attacking Persia he defeated Shah Ismaïl at Calderon with immense slaughter (1514), and annexed Kurdistan and Mesopotamia. Conquering Syria (1516), the title Servant of the Two Holy Cities (Mecca and Medina), hitherto reserved to the caliphs, was added to his name in the official prayer. He subdued Egypt (1517). The Sherif of Mecca sent him the keys of the Kaaba, and Mohammed XII, the last Abasside caliph, resigned to him the insignia and the rights of the caliphate. Since then the Ottoman sultan has been both the political and spiritual head of Islam. Excessive use of opium hastened his end, and he died at Tchorlu, where eight years before he had fought against his father. A gifted poet, profound scholar, far-sighted statesman, and resistless conqueror, he was bloodthirsty and cruel beyond expression. He is the only parricide among the Ottoman sultans.

SELIM II, MEST ("the Drunkard"), 1524–74; son of Suleiman II and Roxelana. His generals subdued W. Arabia (1567) and Cyprus (1571), but lost the battle of Lepanto (1571), where 220 Ottoman ships were sunk or captured, 30,000 prisoners taken, and 15,000 Christian galley slaves set free. Meanwhile Selim cared only for drink and the pleasures of the harem, and died from overindulgence in wine.

SELIM III, 1761–1808; son of Mustapha III; succeeded his uncle Abd-ul Hamid I. At his accession the empire seemed near dissolution. Selim was the first sultan animated by Western ideas. Ridding himself of foreign war by the Treaty of Jassy (1792), he endeavored to repress disorder and introduce reforms. But popular fanaticism denounced his innovations as violations of the Koran. The support he received from France excited the jealousy of Great Britain. A British fleet appeared before Constantinople, but was repelled. Finally the janizaries and the clergy combined; Selim was deposed and confined in the seraglio and his cousin Mustapha IV raised to the throne (1807). Baïractar Pasha, his devoted adherent, in 1808 marched upon Constantinople. Thereupon Mustapha had Selim bowstrung, and Baïractar penetrated the palace in triumph, only to find the corpse of his master in the throne room.

Seljuks', a Turkish tribe which, being driven from the highlands of Turkestan, settled in the plains on the E. of the Caspian Sea. There they were converted to Islam. They were famous for strength and courage, and the Caliph Motassem (833–842) chose his bodyguard from among them. Under the leadership of their chief Seljuk—whence the tribe derives its name—these guards revolted, seized the temporal power, and founded an independent state in Khorassan, though all the time acknowledging the spiritual supremacy of the caliph. Togrul Beg, grandson of Seljuk, completed the subjugation of Persia, and assumed the title of sultan. The extent and prosperity of the empire largely increased under his nephew Alp-Arslan (1063–73), the conqueror of the Byzantine emperor, Romanus Diogenes, and under Malek Shah (1073–93), the son of Alp-Arslan. Malek Shah conquered Arabia, Syria, and Palestine, Armenia, and a large part of Asia Minor, ruling as far as the Chinese frontier, and from the Caspian to the Arabian Sea. He founded at Bagdad a law school and an observatory, but removed the capital to Ispahan. His works of public utility were ably seconded by his vizier, Nizam-ul-Mulk. The growth of the Seljuks was due to their religious ardor, to the intrepidity of their early chiefs, and to their facility in assimilating their kindred of Turkish stock, and also subject races. Their decline dates from the division of their empire

by Malek Shah into sultanates for his four sons. The sultanate of Iconium comprised nearly all Asia Minor, and lasted till 1299. From its ruins arose ten principalities, one of which, under the Emir Othman, was to subdue all the rest and develop into the Ottoman Empire. The Seljuks of Iconium and Iran bore the brunt of the first and second crusades.

Sel'kirk, Alexander, abt. 1676–1723; Scottish seaman. He went from England in 1703 as sailing master of a privateer, and in September, 1704, after a quarrel with his captain, was put ashore at his own request on Juan Fernandez, where he remained in solitude four years and four months. Later he entered the navy, and was lieutenant when he died. Defoe's "Robinson Crusoe" (1719) has been supposed to be based upon the adventures of Selkirk, but there is little reason for supposing that Defoe had more than a general knowledge of the facts of the case.

Selkirk Moun'tains, range in British Columbia, W. of the Rocky Mountains, and N. of Idaho, about 175 m. long and 80 broad. Highest summit, Mount Macdonald (formerly Mount Carroll), 9,940 ft. Large timber is abundant, and bears and Rocky Mountain sheep are found.

Selt'zer Wa'ter, the water of a mineral spring at Selters, in Nassau; known since the ninth century. Having become the most widely known of mineral waters, it is chemically imitated in the U. S. and Europe. It is alkaline, containing 6 grains of sodium carbonate to the gallon, with 30 cu. in. of free carbonic acid; also traces of lithia, baryta, and strontia, and of fluorine.

Seman'tics, or Semasiol'ogy, the doctrine of historical word-meaning; the systematic discussion of the history of changes in the meanings of words. The so-called "etymology" of a word exercises no restraint upon its meaning; it serves only to help in explaining how a present meaning came to be what it is. Thus the comparison of German *klein* (little) with its predecessor, Old High German *kleini* (fine, neat, small), and with its cognate English *clean*, serves only to show that the meaning "little" came to the word by the route: clean, neat, trim, fine, small. When a special meaning displaces the general meaning and sets itself up in its stead as the general meaning, a shift of signification has taken place. Thus the word bead once meant "prayer" (cf. German *gebet*). It was also applied to a ball of the rosary that marked a prayer. This special meaning has become the normal meaning.

Sem'aphore, a term originally applied to telegraphic or signaling machines the action of which depended upon the motion of arms round pivots placed at or near their extremities. Many kinds of semaphores were in use before the invention of the electric telegraph, and a simple form is still employed on railways to regulate traffic.

Sem'ele, in Grecian mythology, a daughter of Cadmus. She was loved by Zeus, and asked him to visit her once in all his royal majesty. Zeus begged her to desist from this demand, but as she would not, and he had sworn to grant her any wish, he came to her with thunder and lightning, and she perished in the flames. She was pregnant by Zeus with Dionysus (Bacchus). Zeus cut the infant from the womb of the dying Semele, and concealed the child in his own thigh until the time for his birth had come, when he was born for the second time.

Semir'amis, according to Ctesias, the wife of Ninus, founder of the Assyrian Kingdom—a woman of extraordinary beauty, passion, and military prowess who flourished abt. 2200 B.C., survived and eclipsed her husband, and after a reign of forty-two years abdicated in favor of her son Ninyas, founder of Nineveh. All this is admitted to be mythical. Herodotus mentions a Semiramis who ruled over Babylon five generations before Nitocris. This Semiramis of Herodotus is certainly not to be identified with the Semiramis of Ctesias. The name appears to have been derived from Sammuramat, found upon the monuments, wife of the Assyrian king, Rammannirari III (811–782 B.C.).

Semirechensk (sā-mē-rā-chĕnsk'), Russian province of central Asia; S. of Lake Balkash, bounded on S. and E. by Chinese territory; area, 152,280 sq. m. Production and trade are very small. Pop. (1907) 1,122,400, largely Kirghiz, the remainder of many races, fully half nomadic.

Semit'ic Lan'guages, a group of languages coördinate in importance with the Aryan or Indo-European, but sharply marked off from it. It includes Arabic, Aramaic, Babylonian, Ethiopic, Hebrew, Phœnician, and Syriac. The name Semitic rests on the assumption that the nations classed in the tenth chapter of Genesis among the sons of Shem spoke languages belonging to a single group, and embraced also all the members of that group. Neither proposition is correct. Instead of Semitic, various terms have been proposed, the most satisfactory among them being Syro-Arabic. The general agreement of the vocabulary is very large, embracing a considerable number of common words, the pronouns in the first instance and terms of relationship in the second, as well as verbal stems. But within the Semitic group the agreement is closed between some as against others. The general character of the Semitic syntax is marked by its simplicity. The most noticeable variation among the Semitic languages is in the writing employed. They present three alphabets: (*a*) The cuneiform characters of Babylonia and Assyria; (*b*) the Phœnician and its derivatives, the square-letter Hebrew, Palmyrene, Arabic, Syriac, Samaritan, together with the alphabet of the S. Arabic and Abyssinian inscriptions as the probable prototype of the Phœnician; and (*c*) the Ethiopic.

To the N. Semitic belong the Phœnician, Hebrew, Moabitic, Babylono-Assyrian, and the various Aramaic dialects, biblical Aramaic, Palmyrene, Nabatæan, the idioms of the Babylonian and of the Palestinian Talmuds, Samaritan, the N. Arabic and ancient Syrian inscrip-

tions, Syriac—Eastern and Western—Mandaic, and the modern Syriac dialects of Urmia, Tur-Abdin, Salames, and of the Lebanon district. To the S. Semitic division belong (1) classical Arabic, and the modern dialects of Egypt, Syria, and Morocco, with Maltese as a fourth, developed under Italian influence; (2) Sabean, also known, though less correctly, as Himyaritic, of which Minæan is a dialect, and which appears to survive in some dialects spoken along the S. coast of Arabia; (3) Ethiopic or Geëz, spoken in ancient Abyssinia, and surviving in the dialects of Tigre, Tigrina, and Amharic, together with its offshoots, Guragué and Harar. Of literature in the true sense nothing has survived in the original Phœnician. Instead there are inscriptions on tombs, temples, votive offerings, seals, and coins, from abt. 600 B.C. to the third century A.D. The Phœnician script is at least as old as 1000 B.C.

Of the Hebrew language, the oldest written remains, which date from the seventh century B.C. (see HEBREW), reveal an alphabet still identical in form with Phœnician. The square characters do not appear till the fourth century B.C.

The bulk of the Old Testament, while containing elements of varying antiquity, dates in its present form from between 800 and 500 B.C. The Psalms (with some exceptions), Proverbs, Lamentations, Ecclesiastes, Song of Songs, Ruth, Job, Esther, and Daniel, as well as the final version of the Pentateuch, belong to the period subsequent to the Exile, the latest being in all probability Daniel and Ecclesiastes, which are to be placed in the second century B.C. After this time Hebrew is still the language of the synagogue, and the medium of interchange between the Jewish scholars, gradually giving way to the Aramaic idiom adopted by the populace upon the return from the Babylonian exile. Of Moabitic speech there is only a single specimen—the monument of King Mesha dating from abt. 850 B.C., and found in 1870 at Dibon, the capital of ancient Moab. The inscription suffices to prove the practical identity of the Moabitic with Hebrew.

Babylono-Assyrian was spoken by the ancient inhabitants of the country between the Tigris and Euphrates. The S. part, the Euphrates valley, is the older settlement. The oldest literary remains of Babylonian are the inscriptions of rulers. Next come many religious texts—hymns and incantations to gods and spirits. From the S. the culture spread to the N., which is distinguished as the Assyrian Empire. About the twelfth century B.C. Assyria secures independence from Babylonia, and soon obtains the supremacy. Beyond historical annals, however, no original literature was produced in Assyria, whereas in the S. poetry, astronomy, and medicine continued to flourish. The writing used in both Babylonia and Assyria is the cuneiform. The bulk of Babylonian literature consists of commercial and legal tablets of clay. Ranging from 2000 B.C. through the Persian and Greek supremacy down to within a few decades of the Christian era, they furnish the most important source for the study of the common speech.

The oldest specimens of Aramaic speech are the inscriptions found at Sindschirli in N. Syria, which date from the eighth century B.C. These mark the N. limit of Aramaic speech, the S. being the Sinai peninsula and central Arabia. In time Aramaic became the popular idiom of the region between the Euphrates and the Mediterranean, and extending N. to the Taurus. The most notable dialects are (*a*) of Palmyra, (*b*) the Samaritan, (*c*) the Syriac proper, *i.e.*, the Aramaic dialect of the Christians at Edessa. Slight variations in pronunciation and expression, in addition to distinctive scripts, warrant the division into E. and W. Syriac. (*d*) A direct offshoot of biblical Aramaic is the later Palestinian dialect, in which the Jerusalem Talmud is written; while (*e*) the idiom of the Babylonian Talmud represents an E. variety of the same dialect. Corrupt Aramaic dialects survive in the Christian settlements around the Lake of Van, in the Kurdish Mountains, and in some Lebanon villages.

Arabic.—The most important of the languages of the S. group is the Arabic, which, through the Mohammedan conquest in the seventh century A.D., usurped the place of Aramaic speech in the Semitic world. European interference with Mohammedan supremacy, from the crusades on, has destroyed to some extent the unity of Arabic speech, so that the dialects of Syria, Egypt, and the W. of Africa have become distinct.

Sabean may be considered an ancient form of Arabic, has been found on inscriptions in S. Arabia (Yemen, Hadhramout), and in some Sabean settlements of central Arabia and in Abyssinia. They confirm the existence of an advanced culture which flourished in the S. as early at least as 1000 B.C., and of which Abyssinian civilization appears to be an offshoot. The alphabet of these inscriptions presents some remarkable features. It is more archaic than Phœnician, and this, in connection with the high rank of Sabean culture, lends force to the theory that makes the Phœnicians the borrowers instead of the inventors of their alphabet, and fixes the place of the invention in S. Arabia. *Ethiopic* falls in the direct line of succession to Sabean, being the form assumed about the fourth century A.D., when Abyssinia became a Christian possession. Ethiopic literature is almost exclusively religious, and it continues in use as the sacred language of the Christian Church in Abyssinia. The popular speech bears the same relation to Ethiopic as the modern Arabic does to the language of the Koran.

The Original Home of the Semites.—One view would place in the Euphrates valley the original home of the Semites. A second view seeks the home of the Semites in Arabia, as being the most favorable for the production of traits, customs, and religious ideas regarded as peculiarly Semitic. More recently Africa has been suggested as the Semitic starting point of Semitic speech and of Semitic migration. An important factor in this theory is the relationship between Egyptian and the Semitic languages, which warrants the assumption that Egyptian itself is a combination of a Semitic substratum with Hamitic elements. There is

nothing improbable in the supposition of an E. migration of Semites into Arabia and the Euphrates valley, and then by further moves an entrance into Palestine and Syria. If, as seems probable, the origin of the so-called Phœnician alphabet, which is so peculiarly adapted to Semitic speech, is to be sought in S. Arabia, an additional support for what may be called the African theory will be found.

Semmes (sĕmz), **Raphael,** 1809–77; American naval officer; b. Charles Co., Md.; a midshipman in U. S. navy, 1826; aid to Gen. Worth in Mexico, 1847; commander, 1855; held a commission in the Confederate navy; notorious by his exploits as commander of the *Sumter* and the *Alabama* (*q.v.*) in capturing and burning U. S. merchant vessels. After the war he was an editor, professor in the Louisiana Military Institute, but returned to Mobile to practice law. Author of "Service Afloat and Ashore during the Mexican War," "The Cruise of the Alabama," and "Memoirs of Service Afloat."

Semoli'na, food much used in France and Italy, and also in Great Britain and elsewhere; consists of a finely cracked wheat, or a very coarse meal made especially from the hard-grained wheats of Spain, Odessa, and S. Italy. As those wheats are not easily reduced to flour, small particles escape being crushed, and after grinding they are separated into grades. Semolina is used in bread, puddings, and soups.

Sem'pach, village of Lucerne, Switzerland; famous for the battle fought here, July 9, 1386, between the Austrians and the Swiss, in which the Austrian noblemen, encumbered by their heavy armor, were butchered like sheep by the Swiss peasants. The army of Duke Leopold, consisting of 4,000 horse, was met by 1,300 Swiss. As the ground was unfitted for cavalry, the knights dismounted and formed a compact body. The Lucerners charged, but not a man of the Austrians was wounded, while sixty of the bravest Lucerners, with their chief, were killed. Then Arnold von Winkelried, a knight of Unterwalden, rushed forward, grasped with outstretched arms as many pikes as he could reach, buried them in his bosom, and bore them down by the weight of his body. His companions rushed into the breach thus made, slaughtered many of the armor-encumbered knights, and threw the remainder into the utmost confusion and dismay. Pop. abt. 1,000.

Senancour (sē-năn-kôr'), **Étienne Pivert de,** 1770–1846; French author; b. Paris; educated for the priesthood, but ran away and lived in Switzerland, whence he returned to France, saddened by the loss of his wife, and beggared. His earnings as a writer were supplemented by a small pension from Louis Philippe, but his struggle with poverty combined with domestic misfortunes and ill health to give his books a melancholy tone. His "Rêveries sur la Nature primitive de l'Homme" shows the influence of Rousseau. "Obermann" (1804) is the story of a solitary and melancholy person, who gives expression to his skepticism and his weariness of life in letters written from Switzerland. While the work is tinged with a morbid spirit, its style is good, and the subject-matter often striking and original. It exerted much influence upon his own and the succeeding generation.

Sen'ate, originally the deliberative assembly of the Romans; in modern times the upper house of the national legislature in the U. S. and in several other countries.

Sendai (sĕn-dī'), city in the NE. of Japan; on left bank of the Shoshi-gawa. It was the castle town of the Date family, who embraced Christianity; and relics of a mission to Rome made in 1615 are preserved. The Greek Church has a strong following in the neighborhood. The town is noted for articles made of fossil wood. Pop. (1903) 100,231.

Sen'eca, Lucius Annæus, 4 B.C.–65 A.D.; Roman philosopher; b. Corduba, Spain. He was trained in his father's art as a rhetorician, and, though he left rhetoric for philosophy, he never forgot the lessons of his youth. His style is characterized by preponderance of form over contents, of expression over thought, which rises from a lack of veracity, and results in mannerism and affectedness. As an orator in Rome he achieved forensic triumphs, but in 41 A.D. Messalina had him accused of adulterous connection with Julia, the daughter of Germanicus, and he was banished to Corsica. Here he lived for eight years, and wrote "De Consolatione ad Helviam matrem Liber," a consolatory letter to his mother, and "De Consolatione ad Polybium Liber," a similar letter to Polybius, a freedman and one of Claudius's favorites, who had lost his brother; but this letter is one of his most disagreeable productions on account of its flattery. When Claudius married Agrippina, Seneca was recalled by her influence in 49, and appointed tutor to her son, afterwards the Emperor Nero. Seneca wrote moral essays, philosophical letters, a biography of his father, orations, physical treatises (now lost), epigrams, and tragedies. The nine tragedies are interesting as the only complete Roman tragedies extant, and from their influence upon the modern revival of tragedy. They are largely versified declamations decked with rhetoric and moral sentiments.

Of his prose essays, the most celebrated, "De Ira," "De Tranquillitate Animi," etc., are inexhaustible sources of piquant quotations; others, "De Clementia ad Neronem Cæsarem Libri Duo," are curious on account of the personal character which the author has not been able to conceal; but the largest portion is vague and trivial—"De Constantia Sapientis," "De Brevitate Vitæ," etc. His 124 "Epistolæ ad Lucilium" have more interest, containing moral observations and aphorisms of practical value. His "Apocolocyntosis" is worth reading. It is a very biting Menippean satire on Claudius, written after the death of the emperor, doubtless written to please Nero, for whom Seneca also composed a funeral oration upon Claudius. Seneca was consul in 56, but after the death of Burrus in 62 his influence with Nero began to wane. The emperor began to hint at the millions which the philosopher had amassed. Seneca offered to repay the

whole amount and content himself with a small annuity. Nero refused the offer, and Seneca retired from the court, and tried to sink into oblivion; but in vain. Some one mentioned him as an accomplice in the conspiracy of Piso, and Nero sent him an order to commit suicide. He opened the veins in his feet and arms, and, discoursing with his friends on the brevity of life and the equanimity of the philosopher, bled to death in a hot bath 65 A.D. From the revival of letters in Europe to the beginning of the nineteenth century, the works of Seneca were much read and admired. There were, however, always some protests against his fame; and when his admirers tried to prove that he was a Christian and a friend of St. Paul, his adversaries undertook to prove that he was an atheist and a hypocrite. Seneca excels in the application of philosophical principles to the practical conduct of life. He reiterated that it was impracticable to set up a high standard of morality in a hopelessly corrupt age. But his influence over Nero, and the example of his life and death, entitle his shortcomings to considerate judgment.

Seneca Lake, one of a range of lakes in W. New York, 35 m. long, 1 to 4 m. broad. Its waters reach Lake Ontario by the Seneca and Oswego rivers. Greatest depth, 630 ft.

Se'nefelder, Aloys, 1771–1834; inventor; b. Prague; went on the stage; afterwards attempted literature, then engaged in the printing business, which led to his invention of lithography.

Sen'ega, root of a perennial plant, *Polygala senega,* which grows throughout the U. S., in open fields and rocky places. The epidermis is dark colored, corrugated, and is the active part of the root. Senega contains polygalic acid, probably identical with saponine. The drug is an acrid irritant, producing vomiting and purging in overdose. Its first use was by the Seneca Indians, in cases of rattlesnake bite, but now it is used in cough mixtures to stimulate secretion.

Sénégal', French colonial dependency of W. Africa; consists of a strip along the Atlantic coast from lat. 18° N. to Portuguese Guinea (excluding English Guinea), and the land bordering on both sides of the Sénégal River below its junction with the Falemé. It is the oldest and most important of the French possessions in W. Africa; has an area of about 806,000 sq. m., and a pop. est. at 1,130,000—200,000 of which are placed directly under the French administration. The climate is subject to high summer temperature, and is not healthful. There are luxuriant forests in some portions, but the soil in general is not fertile. The principal exports are gold, ground nuts, gum, palm nuts and oil, and rubber. The capital is St. Louis; pop. 24,000.

Senegal, the name of the largest river of Senegambia, NW. Africa. It lies almost on the border of the Sahara, and derives its water chiefly from several large S. tributaries rising in the regions of Futa Jallon and Bambara. Though a bar at its mouth obstructs navigation from the sea, the lower half of the river (500 m.) is navigated at high water by small steamers.

Senegam'bia, French possession in Africa, now part of upper Sénégal—Niger Colony. See SENEGAL.

Sen'na, the leaves of several species of *Cassia,* used medicinally. They are exported from S. India and from Alexandria. The valuable cathartic principle of senna is cathartic acid, a complex glucoside, which contains sulphur. It is easily alterable, and hence difficult of isolation and preparation. Senna is a safe cathartic, but has a disagreeable taste and odor.

Sennaar', an ancient kingdom of the E. Sudan, Africa, which retained its name when it became a province of Egypt. The soil is so fertile along the river banks that Sennaar was called the granary of the Egyptian Sudan. In its flourishing days there was a dense population along the two great rivers, in whose valleys much grain was raised, while in the towns many industries were pursued. Sennaar, for generations the chief town, was important until Khartum became the center of commerce. Its population had dwindled to 8,000 before the Mahdist revolt. It was the last Egyptian stronghold to succumb to the Mahdi. Now only heaps of stone mark its site.

Sennach'erib, King of Assyria, 705–681 B.C.; son and successor of Sargon. He was vain and haughty, a scourge in war, and a great builder. His campaign against the West in 701 was unsuccessful (II Kings xviii, xix), as may be seen also from his own account of the affair. He boasts that he destroyed Babylon because this city bore the Assyrian yoke unwillingly. He was murdered by two of his sons.

Sensa'tion, the phenomena which result within the mind immediately from impressions upon the senses. An impression is the modification of the sense organ and nerves as a result of external stimulus, and may take place without producing a sensation, either because it is too feeble, too often repeated, or because the attention is otherwise occupied. The characters of sensation are (*a*) quality, as color, sound, taste; (*b*) quantity, or intensity, which is investigated by psycho-physics; (*c*) duration, which is investigated by psychometry; and (*d*) tone, or the accompanying pleasure or pain. The relativity of sensations is illustrated by the phenomena of contrast, which is that any sensation (color, sound, taste) which occurs after or with other sensations (colors, etc.) is different from what it would have been if the other sensations had not been present, or if the other sensations had been different; the variation, however, is within the same sense quality.

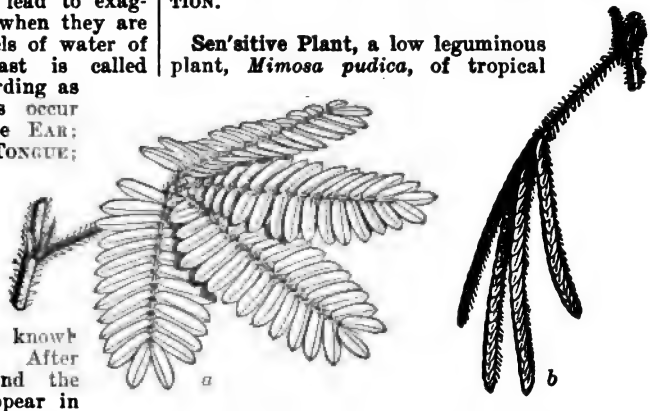
Such effects of one sense quality upon another may be subjected to experimental determination. Color contrasts are the richest and best understood class of facts. In general, color contrast means that when part of the retina is stimulated to react to a particular color, there is a tendency of other portions to

react to the complementary color. For example: Put a scrap of gray paper on a colored (red) background, and spread over the whole a sheet of white tissue; the gray scrap will tend to assume the color complementary to the background (green). The white sheet over the whole is necessary to obscure distinct lines of separation; if such distinct boundary lines are exposed, the contrast phenomena disappear. Also, the pitch of a tone is modified by the occurrence of another tone of a different pitch, in such a way that the interval between them is lessened. Contrasts of temperature are easily brought about. Cold water feels colder if the hand is just from warm water. Differences in temperature of the two hands lead to exaggerated differences of sensation when they are plunged together into two vessels of water of the same temperature. Contrast is called simultaneous or successive according as the rival sensational qualities occur together or in succession. See EAR; EYE; FEELING; NOSE; TASTE; TONGUE; TOUCH; SENSES.

Sensa'tionalism, in philosophy, the doctrine that all knowledge is derived originally from the senses. Its synonyms are "sensism," "sensualism," "sensuism," "empiricism," etc. Hobbes (1650) taught that all knowledge grows out of sensation. After sensation there remains behind the memory of it, which may reappear in consciousness. The memory of objects is aided by words. We therefore connect words to our mental representations of objects. The same word, serving as a sign for numerous similar objects, gives rise to general ideas. Desire arises from the recollection of a past sensation. Cabanis said that thought is a secretion of the brain; Carl Vogt added, "the brain produces thought in the same way that the liver produces bile," etc. J. S. Mill (1865) defines matter to be "a permanent possibility of sensation," and mind to be "a series of feelings with a background of possibilities of feeling"; thus making sensation the central principle, not only of knowledge, but of being. As to universal and necessary ideas, such as time, space, causality, etc., Mill holds the geometrical axioms to be "generalizations from observation." Spencer holds that knowledge consists in "symbolic conceptions" when it relates to aught else than concrete objects that are not "too great or too multitudinous to be mentally represented." In contrast to this, he holds that "the ultimate truth which transcends experience by underlying it is the persistence of force."

Sen'ses, special developments of the general sensibility of the living organism. In the special senses, *i.e.*, hearing, sight, etc., the property of general sensibility of the organism is modified in distinct organs, the ear, the eye, etc., so that each organ transfers from the object to consciousness only a distinct part of that total impression which the object is able to give and consciousness is capable of receiving—the ear only the audible, the eye only the visible, etc. The senses—hearing, sight, smell, taste, and touch—all rise simply as individual developments of general sensibility. Their degree of individualization is different, being highest in sight and feeblest in smell and taste; the latter both disappear very easily in mere feeling, as smell in sneezing and taste in nausea. General sensibility covers a much larger ground than the five senses. There are sensations which enter into consciousness with vividness without going through the special senses, as the feelings of hunger, thirst, suffocation, pleasure, pain, rest, fatigue, etc. These are general sensations. See EAR; EYE; FEELING; NOSE; TASTE; TONGUE; TOUCH; SENSATION.

Sen'sitive Plant, a low leguminous plant, *Mimosa pudica*, of tropical America, now widely dispersed and commonly cultivated, on account of the rapid movement of the leaves which, when brushed or jarred, appear to shrink from the touch. This faculty is shared by several species of *Mimosa* and related plants, such as the sensitive brier (*Schrankia*) of the S. U. S.



LEAF OF SENSITIVE PLANT *a*, expanded; *b*, closed.

Senso'rium, the seat in the nervous system of the processes which underlie sensation. The cortex or gray matter of the brain is considered the sensorium in modern physiology and psychology.

Sen'tence, in law, a judgment or determination pronounced by a court after hearing a cause, by which the remedy is granted, etc. At common law "sentence" refers only to criminal cases, the decision of a civil suit being a "judgment," or, in equity, a "decree." A prisoner is convicted when a verdict of guilty is rendered against him by the jury. It is then the duty of the judge, in cases of felony, to ask the convict if he has anything to say why sentence should not be issued upon him. This, now a mere formality, is a survival from the time when the accused could not be defended by counsel.

Sen'timent, the higher form of emotion, attaching to ideals of art and life. The great classes into which the sentiments fall are ethical, æsthetic, and religious. Religious objects and ideals involve both the ethical and æsthetic determinations—that is, they are both beautiful and good.

Conscience is the popular term for the ethical sentiment. Moral sentiment arises evidently around acts and attitudes of will. It is accordingly to be expected that the account of the genesis of will can throw some light upon the rise of conscience.

When I come to a new moral situation I am in a condition of relative equilibrium, or balance of two factors—my personal or habitual self and my social suggestive self. Your natural disinclination to attend a social gathering at the house of Mr. A may be overcome by an appeal to your family, social, public self in its broad sense, supplemented by an appeal to your sympathetic, narrower, social self. The new decision tends to destroy this equilibrium, and so to lead me out for further habit or for new social adaptations.

The friend who urges you to accept an invitation to Mr. A.'s reception adds to the reasons, "And, besides, you ought to go out more." This is the profoundest reason of all —not because it has in it the word "ought" merely, but because it makes appeal to the ideal self, before the law of which all the earlier claims have their lesser or greater value.

In beauty or the æsthetic sentiment the elements of the ideal seem to be most fully set forth. The simplest observation of beautiful things illustrates the necessity of both unity and variety in form. There is no beauty when unity is absolute, and it is only when arrangement is possible to a degree which allows a distinction between variety which is yet unity, which has a plan, and variety which is multiplicity, which has no plan—that any such feeling arises at all. Psychology tends to a view of art which emphasizes the subjective or emotional side of æsthetic. Considering pleasure the most general element in æsthetic experience, we may bring the topic under the head of hedonics, and ask what are the marks of objects, situations, ideas, which make them suitable for arousing in us the particular kind of hedonic experience called æsthetic, *i.e.*, what constitutes beauty?

Experiments on sensation states—especially on the apprehension of visual forms—result in showing that whenever union of parts is effected without strain to the organ stimulated, at the same time that the elements preserve their individuality, we experience pleasure. In perception a similar principle is found, known as assimilation, to which current psychological analysis is reducing the old laws of association. An argument is such a scheme of notions, which go together without strain or conflict; and a beautiful character is one whose acts of will are consistent, and gets assimilated readily in an ideal of duty. See EMOTION.

Seoul (sā-ōl'), formerly SEUL, SÖ-UL, or HAN-YANG, capital of Korea; on the Han-Kang. It is surrounded by a wall, 12 to 25 ft. high, now in ruins, with eight gates which are closed at night. It has three straight streets, about 60 ft. wide and starting from the three principal gates. These are fairly well kept, but the other streets are narrow and filthy. There are but two noteworthy buildings, the palace of the king and a small Buddhist temple of white stone, once richly ornamented, but now much defaced. The city dates from 1397 A.D.; became a royal city at the end of the sixteenth century, and was sacked by the Manchus in 1637. It was long forbidden to foreigners, and in 1888 a fanatical outbreak against foreign residents occurred. The city was occupied by the Japanese in 1894. Pop. (1908) 196,646.

Separa'tion (of husband and wife), a voluntary cessation of the marriage relation in pursuance of a contract between the husband and trustees representing the wife. Such a contract does not affect the validity of the marriage or the legitimacy of children born of the husband and wife during the time of any such contract, since they may at any time agree to live together as husband and wife. In an agreement for total separation, however, the husband forfeits his right to bring an action for criminal conversation with the wife, but not his right to proceedings for divorce for adultery on her part. Separation *by law* is usually termed separation *a mensa et thoro*, and is a species of divorce not dissolving the marriage relation, and much less extensive in its effects than a divorce *a vinculo matrimonii*, or one annulling the marriage. See DIVORCE.

Sep'aratists, in general, those who withdraw from an established church or religious organization; sectaries. The term was commonly applied in England in the sixteenth and seventeenth centuries to those who were also called Brownists and Barrowists, and later Independents.

Sep'arator, Cream, machine used for the separation of cream from the rest of the milk. It is composed of a strong steel bowl or cylinder, so arranged that it may be made to revolve at a speed of 6,500 to 7,500 revolutions per minute. The milk being introduced at the center of the cylinder, the centrifugal force causes it to be carried to the sides, and, acting with greater force upon the heavier particles or serum of the milk, separates the milk in the bowl into a layer of skim milk next the wall and cream nearer the center. Exits are so arranged that any desired proportion may be constantly drawn off from both the skim milk and cream layers, and the whole milk constantly flowing into the bowl the operation is continuous. By regulating the speed of the machine and the rate of inflow the fat of the milk may be almost completely gathered into the cream, and only the very smallest globules left in the skim milk. For the best results the milk should be at a temperature of 86° to 90° F. The inflow should be regular, and the number of revolutions not fall below 6,500. The larger power machines have a capacity of 3,000 to 4,000 lb. of milk per hour, and smaller hand-power machines have a capacity of 250 to 350 lb. per hour.

Se'pia. See INDIA INK.

Se'poy, a native soldier in the British service in India. The practice of enlisting the

natives dates back to the middle of the eighteenth century. A large force of Sepoys took part in the battle of Plassey, and Clive afterwards organized a native army in Bengal. Their good conduct inspired confidence in their loyalty, and their numbers were increased till at the time of the mutiny they were 230,000 strong, while the European troops numbered 40,000. After the suppression of the mutiny (1858) their numbers were reduced, and in 1894 there were 145,000 natives to 75,000 Europeans in the British army in India. The Sepoys consist of Mohammedans, Rajputs, Brahmans, and men of other castes, besides Sikhs, Gurkhas, and hillmen of various tribes. The higher officers are European.

Sepoy Mu'tiny. See INDIAN or SEPOY MUTINY.

Seppu'ku. See HARA-KIRI.

Septem'ber, the seventh month of the old Roman year, but the ninth of the Gregorian. It is the month of the autumnal equinox, which occurs about the 22d.

Septicæ'mia. See BLOOD POISONING.

Septima'nia, an ancient district in SW. France, so called from its seven cities—Toulouse, Agen, Bordeaux, Poitiers, Saintes, Périgueux, Angoulême; ceded to the Goths in 419. It was conquered by the Saracens, 712–719; desolated by Martel, 737; conquered in part by Pepin, 760; a part of Aquitaine, 778; and devastated by the Normans, 859. The Spanish March was set off in 864, and soon after it passed to the house of Toulouse.

Septim'ius Sev'erus. See SEVERUS, SEPTIMIUS.

Septuages'ima, in the ecclesiastical calendar, the third Sunday before Lent. The first Sunday in Lent is Quadragesima, the three preceding ones Septuagesima, Sexagesima, and Quinquagesima.

Sep'tuagint, or **LXX,** the earliest Greek translation of the Old Testament, otherwise called the Alexandrian version. The fabulous account of its origin is that Ptolemy Philadelphus, King of Egypt (283 (285) to 247 B.C.), sent to Jerusalem to procure from the high priest Eleazar a copy of the Jewish Law, and to make arrangements for its translation into Greek. Seventy-two learned men were selected by the high priest, six from each tribe, and sent to Egypt with a copy of the Law written on parchment in letters of gold. They retired to the island of Pharos, where they completed the translation in seventy-two days. The legend appears with embellishments in Justin Martyr, according to whom the translators were shut up in separate cells and worked independently, yet their several versions, being compared, were found to agree verbatim.

The character of the translation proves it to have been the work of many hands. The Pentateuch is best translated. Anthropomorphisms and offensive expressions are often softened; *e.g.*, for "they saw the God of Israel" (Ex. xxiv, 10) we read "they saw the place where the God of Israel stood." The translation of Proverbs has considerable merit, and the Book of Job was rendered by a man of genius, who was better acquainted, however, with the Greek poets than with Hebrew, and dealt very freely with his text. The speech of Job's wife (ii, 9) is a curious interpolation. Ecclesiastes is rendered with barbarous literalness, so as to be in some places unintelligible; *e.g.*, Ecclesiastes vii, 30. The prophets are for the most part poorly translated, especially Isaiah. In the controversies between Jews and Christians in the second century it was found that the LXX could not be relied on as an accurate representation of the Hebrew, and other translations were made. From no other source is so much illustration to be derived of the peculiar Greek of the New Testament. It has also value as a help in the criticism of the Hebrew text.

Sep'ulture. See FUNERAL.

Se'quence, in music, a chainlike progression, in which a short musical figure or group of notes is repeated several times on successive steps or degrees of the ascending or descending scale. As a sequence is thus only a group placed one degree higher or lower at each repetition, it can have (in itself) no proper termination, but may be continued indefinitely or through the whole range of the scale. One of the simplest forms of sequence is that made by a chain of thirds and sixths, with each sixth suspended by the seventh, as at *a*, Ex. 1, or with a suspension of the sixth by the fifth, as at *b*:

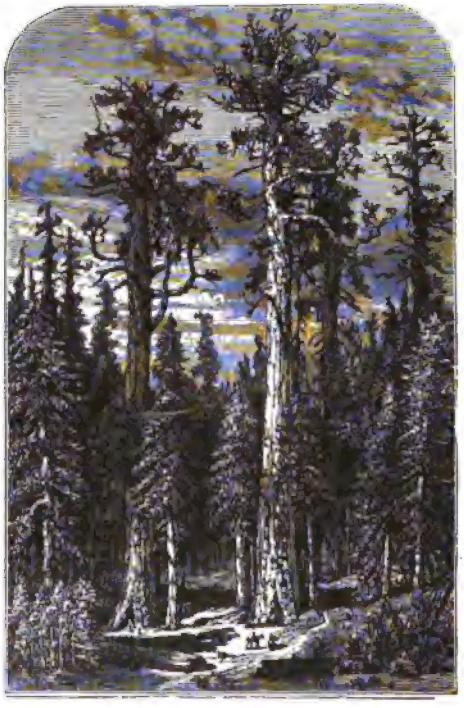
Ex. 1.—*a*

b

Sequin (sē'kwĭn), name applied to various Italian and Levantine coins. The original sequin was a Venetian gold ducat of the thirteenth century, worth $2.30; the Turkish sequin was worth $1.10 to $1.75.

Sequoia (sē-kwoi'ă), genus of coniferous evergreen trees, natives of the Pacific coast, named in honor of Sequoyah, the Cherokee Indian who invented letters for his people. The first species discovered was the Californian redwood, which is found from Mexico northward, but never far from the coast. It reaches a diameter of 28 ft. and a height of 275 ft. The redwood has been of great value to the settlers of California. The timber is light and close-grained, but not very strong; it resembles in appearance red cedar, but is darker; it splits with facility, and has been largely used for fencing; it may be made into boards without the use of a saw; being eminently durable, and not attacked by insects, it is used for building purposes and for cabinet work; it is said to dry without shrinking. The only other species of *Sequoia* is *S. gigan-*

tea, known as the "great tree of California" and the "mammoth tree," the groves of which are generally called "the big trees." Until the discovery of Australian eucalypti, as tall if not larger in girth, they were regarded as the most gigantic of vegetable productions; 30 ft. is not an unusual diameter, and some have measured 33 and 36 ft, and with their buttresses even more in diameter and their heights 275 to 450 ft. The bark, often 15 in. thick, is of a brown color. The cultivation of the tree has not been successful in the E. states, but it grows well in England, where it is called *Wellingtonia*, or *S. Wellingtonia*. Both species require a humid atmosphere. The age of sequoias was formerly estimated as high as four to six thousand years, but countings of annual rings reduce the age of the oldest to between two thousand and twenty-five hundred years.



GROUP OF MAMMOTH TREES.

Serape'um, the temples and tombs of the Apis bulls (see SERAPIS) of Memphis, Egypt. Another Serapeum was located near the present line of the Suez Canal, overlooking the Bitter Lakes. The Serapeum at Alexandria, erected by the Ptolemies, was probably in the form of a Greek temple. In the same building was the Alexandrian Library, and both perished together after the edict of Theodosius, abt. 390 A.D.

Ser'aph, plur. **Ser'aphim**, a word which occurs but twice in the Bible (Isa. vi, 2, 6). The seraphim are described as creatures, human in appearance, with six wings, symbolical of the "devouring fire" of Jehovah's holiness.

Seraph'ic Breth'ren. See FRANCISCANS.

Sera'pis, an Egyptian deity, ostensibly a combination of Osiris with the Apis, the bull sacred to Ptah, an incarnation of Osiris, which symbolized the "perpetual regenerating power of the god." In some conceptions the Apis was associated with the moon. His native name, *Hapi*, belonged also to the Nile, which revivified the land, and to the cynocephalous deity of the dead, who represented the principle which revived the dead. In the later conception the deity was Greco-Egyptian, combining Pluto and Esculapius and the Egyptian Osiris. The Apis bull, the basis of the Serapis worship, was thought to have descended from a cow that had been impregnated by a ray of the moon. He must have distinctive marks: A triangular white spot on his forehead, a scarablike growth beneath his tongue, a white vulture or eagle and a scarab on his flank and haunches, and a tail with both white and black hair. The discovery of an animal that possessed these features was greeted with universal joy, and its death with mourning. He was kept with care in a temple at Memphis, where he received divine honors. When he died he was mummied, and buried with pomp in the Serapeum. His emblem was a bull with the sun disk and uræus serpent between his horns. The worship of the Apis began early, and Apis priests are mentioned in the fourth dynasty. Alexander the Great and the Roman Titus paid honors to the Apis of Memphis. His worship spread also to other countries, and in 82 A.D. Domitian built a temple in his honor at Rome.

Sere'na, La, capital of COQUIMBO (*q.v.*).

Serf, one held in a modified form of slavery, bound to the soil and without rights as against his master, who could not, however, sell him like a chattel slave. During the Middle Ages serfdom formed one of the most prominent elements of the social order. It originated from the slavery of the ancient republics, and was transformed by the concurring influences of Christianity and feudalism. Slavery existed among the Germanic tribes, who reduced their captive enemies to that condition, but after the invasion of the Roman Empire these slaves or thralls were raised to the position of serfs, whose numbers were greatly increased by the addition of the native population of the conquered districts. Then, too, famines and the need of protection drove many to sell themselves to the powerful, especially to churches and monasteries. It was generally true that the condition of the serf was far superior to that of the slave under Roman law.

In England before the Norman conquest a large part of the population was in serfdom, the *theow* being the lowest in the social scale and approaching the condition of a slave, while the *ceorl* could not be bought or sold and enjoyed some personal rights. With the Conquest the *theow* disappears and the *ceorl* becomes the Norman *villein*, whose condition was an improvement on that of his Anglo-Saxon predecessor. If maltreated by his master he might have a hearing in the king's court, and he enjoyed the full protection of the law against

strangers, but he could not own property, and could be sold with the land which he tilled. The crusades favored emancipation, as the serf who took the cross became free. The abolition of serfdom in Europe was gradual. In England it gradually disappeared during the fifteenth and sixteenth centuries. It is mentioned for the last time in 1574 by a commission issued for its abrogation in Cornwall, Devon, Somerset, and Gloucester. In France serfdom was maintained, often in harsh forms, up to the revolution. In Denmark it was abolished in 1784, in Prussia in 1808, in Hungary in 1848 by the revolutionary anti-Austrian Diet, and in Russia in 1861 by Alexander II. See SLAVERY.

Serge, various twilled fabrics. Silk serge is a coarse and strong material used for lining coats, making light shoes, etc. Woolen or worsted and woolen serges are made for ladies' cloaks and other uses. Some coarse serges are used for the garments of certain ecclesiastics. Other finer kinds are in some countries used exclusively for shrouds.

Ser'geant, a noncommissioned officer (*i.e.*, an enlisted man holding a warrant giving him a limited authority over his fellow soldiers) in the army and marines, of a rank higher than that of corporal. Each infantry company has sergeants, one of whom is called first sergeant. Each battalion has a sergeant major, who is the highest noncommissioned officer of the battalion. He is the executive officer of the adjutant, and superintends the making of details and the performance of other duties. There is also a quartermaster sergeant to each battalion. Color sergeants, gunnery sergeants, etc., are appointed for special duties.

Ser'iculture. See SILK.

Se'ries, in mathematics, a succession of terms whose values proceed according to some law. The most familiar examples are the progressions of elementary algebra, called respectively arithmetical and geometrical progression. A series may terminate at a certain term, but more commonly it may be continued without end. In the latter case it is called an *infinite series.* The above-mentioned progressions are examples of infinite series because either of them, when once started, may be continued indefinitely. An infinite series may be either *convergent* or *divergent.* A convergent series is one the sum of all of whose terms approaches a certain limit if the series is continued indefinitely. For example,

$$1 + \tfrac{1}{2} + \tfrac{1}{4} + \tfrac{1}{8} + \text{etc., } ad\ infinitum,$$

will approach 2 as a limit, always differing from that limit by a quantity equal to the last term included in the addition. A divergent series is one the sum of whose terms does not thus approach a limit. A series may be divergent in two ways; the sum of the terms may increase beyond all limit, when their number becomes infinite, and may therefore be called infinity. But the sum may also be continually larger and smaller, without increasing indefinitely. Such a series is

$$1 - 1 + 1 - 1 + \text{etc.}$$

The sum of this series will always be either 0 or 1, according as the number of terms added is even or odd. It is therefore called divergent. Series are of very extensive use in advanced mathematics, especially in the applications of algebraic methods.

Serinagur', city of Kashmir. See SRINAGAR.

Seringapatam', or **Srirangapatam',** city of S. India, formerly capital of Mysor; on an island in the Cavery. Under Hyder Ali and Tippoo Sahib its fortifications were strengthened, and although unhealthful it had 300,000 inhabitants. In 1799 it was conquered by the British, and now its population is less than 12,000.

Ser'mon. See HOMILY; HOMILETICS.

Se'rous Mem'brane, the membranous walls of the arachnoid, pleural, pericardial, and peritoneal cavities, and the investing membrane of the testis. Serous membranes, in all instances save the peritoneum in women, are closed sacs, with their opposed walls more or less in contact, but lubricated by secreted serous fluid, so as to permit of free motion to the organs of the body. The movements of the heart, lungs, and intestines, the limited increase and decrease of size of the brain, and the friction of the joints are facilitated by the well-lubricated serous membranes surrounding them. In certain parts the folds of the serous surfaces serve as ligaments to hold the organs in their proper places. The diseases of serous membranes are chiefly inflammatory, and often involve the underlying invested organs. Hence they are usually very grave. Acute meningitis, acute pleuritis when involving the lung also, pericarditis, and peritonitis all are attended with danger, and often are fatal.

Ser'pa Pin'to, Alexandre Alberto da Rocha, 1846–1900; Portuguese explorer; as major led a Portuguese scientific expedition (1877–79) from Angola to the Transvaal. His "How I Crossed Africa" appeared in several languages. In 1884–86, with Cardozo, he led another expedition, extending Portuguese influence in Mozambique to Lake Nyassa.

Ser'pent, any reptile of the order *Ophidia.* Serpents have no external limbs, have elongated bodies which graduate into the tail without abrupt distinction between the two. The back and sides are covered with scales which, on the lower surface, are broadened into plates. When the muscles contract, these plates strike backward and the body is thrown forward. Locomotion is also assisted by the backward and forward motion of the ribs. The rudiments of limbs are found in some snakes in the form of groups of bones embedded in the skin and terminating in a claw. The loose connection of the lower jaw to the skull permits the snake to stretch its jaw and throat so as to swallow animals apparently larger than itself. Snakes do not masticate their food, but swallowing is aided by copious secretions from the salivary glands. Like most reptiles, they are sensitive to cold, becoming lethargic in winter. The muscular irritability is great, the heart palpitates long after it is removed from the body,

and the jaws open and shut in the decapitated head.

The senses of smell, hearing, and taste are very imperfect; the eyes, without lids and constantly open, appear immovable; the principal seat of touch is in the soft and extensile tongue. The scales offer every variety of color and marking, but in most the general color resembles the objects on which they habitually live. They are divided into venomous and nonvenomous; the first, like the cobra, rattlesnake, and viper, have movable fangs in the upper jaw communicating with a poison gland. All feed on living prey, which is swallowed whole; while some are rapid in pursuit, others crush their victims to death, or poison them, or bring them within reach of their jaws by a kind of fascination, terrifying by their hideous and menacing aspect some of the active and smaller mammals and birds into a momentary loss of power. They eat and drink rarely, and are capable of sustaining very long fasts; digestion is performed very slowly. See OPHIDIA.

SERPENT, a musical wind instrument of brass invented by Edme Guillaume of Auxerre, 1590. It has a curvilinear form, is composed of a mouthpiece, a neck, and a tail, and has six holes stopped with the fingers, with a compass from B flat below the bass staff to G, the treble-clef line.

Ser'pentine (named from its mottled yellow and green colors, resembling the skins of serpents), a rock chiefly composed of hydrous magnesium silicate. The mottling is due to the admixture of other minerals. White spots are usually due to calcite or dolomite, the rock being called ophiolite or ophite. *Verd antique* is the name of any serpentinous marble. Serpentine occurs in large bodies interbedded with limestone and various crystalline schists, or in veins traversing other rocks. It has usually resulted from the decomposition of magnesium silicates, chiefly olivine and pyroxenes. Serpentine is widely distributed. On account of its color and its susceptibility to high polish it is much employed for ornament as well as for building.

Ser'pent of Del'phi, a column of Corinthian brass, fashioned to represent three intertwined serpents, and consecrated by the Greeks to Apollo after the battle of Platæa (479 B.C.). It was taken to Constantinople by Constantine, and has stood ever since in the Atmeïdan, the ancient Hippodrome. The heads and upper portion have been broken off, but the torse still remaining is 18¾ ft. high. The names of nineteen of the Greek cities which resisted Xerxes may be discerned, cut deep in the metal not later than 475 B.C. The twelve other names higher up have been almost obliterated. No more precious monument of Greek antiquity exists.

Serpent Mound, an earthwork in Adams Co., Ohio, 1,000 ft. long, 30 ft. wide, and 4 ft. high.

Serpent Wor'shipers. See OPHITES.

Ser'ra, Junipero, 1713–84; Californian missionary; b. Majorca; entered the Franciscan order, sent to Mexico, 1749, and labored among the Indians. When the Jesuits were expelled in 1767, Father Junipero was made president of their missions in California, then confined to the peninsula of lower California. One of his first measures was to extend his field to upper California (now California). The San Diego mission was founded July 16, 1769; Monterey soon after, and others later. These were the first civilized communities within the bounds of the present state. Many of the buildings remain.

Serrano y Dominguez (sĕr-rä'nō ē thō-mēn'-gĕth), **Francisco** (Duke de la Torre), 1810–85; Spanish soldier and statesman; b. San Fernando, near Cadiz; entered the army and rose rapidly; joined Narvaez to overthrow Espartero, 1843; became lieutenant general and senator, 1845, and obtained much influence over the queen after her marriage (1846); became captain general of Cuba, 1860–62, and won a dukedom by his successful efforts to reannex Santo Domingo. In 1866 he was president of the Senate in Spain. His opposition to the government caused his exile to the Canary Islands, July, 1868, when he took part with Prim and Topete in effecting the revolution which drove Isabella from the throne. He then became the ostensible head of the government as president of the Council of Ministers and commander in chief; was elected regent, 1869; negotiated the acceptance of the Spanish crown by Amadeus of Italy, by whom he was made Premier, January, 1871; resigned that post in July; took the field against the Carlists, April, 1872; concluded with them the Convention of Amorevieta in May; returned to office as Premier; fled to France after the proclamation of the republic (April, 1873), but returned; was chief of the executive after the coup d'état of Gen. Pavia, January, 1874, and at the head of the government till 1875, when he resigned his authority to Alfonso XII.

Serto'rius, Quintus, abt. 121–72 B.C.; Roman general; a native of Nursia in the country of the Sabines; distinguished at Aquæ Sextiæ (102 B.C.) under Marius. He fought with Cinna at the Colline gate in 87 B.C. against Pompeius Strabo, but he did not participate in the bloody massacre which Marius instituted at the capture of Rome; but put to death a gang of 4,000 slaves whom Marius had let loose on the city, and who had perpetrated the most horrible cruelties. In 82 B.C. he was sent to Spain as proprætor, but in the same year Sulla returned to Rome from Asia, and the power of the democratic party came to a sudden end. Sertorius maintained his position in Spain against the leading generals of Rome. He gained the favor of the natives, and drew about him the remnant of the Marian party. In 74 B.C. he formed an alliance with Mithridates. Metellus Pius, whom Sulla first sent against him, was defeated, and even Pompey, who came to Spain in 76 B.C., was driven back across the Ebro; but jealousies arose in Sertorius's camp, and in 72 B.C. he was assassinated.

Se'rum, the watery portion of certain animal fluids. Serum of milk is whey containing no albuminous matter, whereas serum of blood

is a strong solution of albumen in a liquid containing certain salts, neutral and alkaline. The total amount of saline matter in the serum of a healthy man is somewhat over ten per cent. Both the saline and the albuminous matter prevent the solution of the blood globules, which are very soluble in water itself, and are attacked at once on addition even of a very little water to blood. The physiological and pathological properties of blood serum have occupied much attention, and there bids fair to be great advancement in the treatment of disease, based upon these studies. The serum of an animal is known to possess properties which render it more or less destructive to invading microörganisms. According as this is ill or well developed will be the likelihood or unlikelihood of a severe attack. See SERUM THERAPEUTICS.

Serum Therapeu'tics, the securing of immunity by the introduction of certain substances in the blood which act in an antagonistic manner to the bacteria of the disease in question, or to the toxic substances they develop. The same sort of immunity may be developed by artificial inoculation with the specific microorganisms themselves, which may be made less powerful by certain methods of cultivation. Immunity may, however, be obtained by injection of the products of the bacteria, obtained either from cultures of the microörganisms or from the blood of a person or animal previously rendered immune by a natural or experimental attack of the disease. The same substances in larger doses act also in a curative way. This treatment is particularly useful in diphtheria. Horses are inoculated with cultures of the diphtheria bacillus, rendered less virulent by addition of trichloride of iodine or other substances, or with small doses of the toxin of these organisms. This develops antitoxic substances and leaves a certain degree of immunity, so that the animal may be injected with greater quantities the second time, etc. After repeated injections the animal becomes practically immune from any dose of the poison. The blood serum obtained from such an animal will be active for the production of artificial immunity in another animal, or in larger dose it will prove curative. See ANTITOXIN; SERUM.

Ser'val, a carnivore of the cat family, native of S. Africa. It is 4 ft. long, of which the tail is 15 in.; the color above is ochrey yellow, darkest on the back, with dark-brown spots, and shading into white on the under parts. It preys upon the smaller mammals and birds; it is not very savage, and the young are gentle like the common cat.

Serv'ant. See MASTER AND SERVANT.

Serva'tus Lu'pus, polemical writer; b. abt. 805; was educated in the monastery of Ferrières, in the diocese of Sens, France, and studied afterwards in Fulda under Rabanus Maurus. For some time he lived at the court of Louis the Pious, and in 842 he was made Abbot of Ferrières by Charles the Bald; d. after 862. He played quite a prominent part in the ecclesiastical history of his time.

Serve'tus, Michael, 1509–53; Spanish author. His Spanish name was MIGUEL SERVEDO. He studied law in Toulouse, wrote against the doctrine of the Trinity, and was obliged to change his abode several times, and even his name. In 1536 he graduated M.D. at Paris, soon became celebrated as a lecturer on medical science, and lived several years with the Archbishop of Vienne, who had been his pupil. His "Christianismi Restitutio" was printed in 1553, and the author was arrested and imprisoned for trial. He escaped, but on his way to Naples stopped at Geneva, and at the instance of Calvin was arrested. The principal charges were sedition, pantheism, and materialism. The opinion of all the Swiss churches was that Servetus should be condemned as a heretic, while they differed as to the severity of the punishment; he was finally burned at the stake. His last words were a reaffirmation of his convictions. The position of Servetus was extremely individual. He was no Arian, and, while denying the tripersonality of the Godhead and the eternity of the Son, he was devoted to the person of Christ and equally to the Bible as the sole standard of authority. His was a boundless intellectual curiosity, a wide and various culture, an absolute sincerity.

Servia or **Serbia**, a former independent Balkan Kingdom of Europe; since the peace treaty of 1919 a part of a new kingdom of Serbs, Croats, and Slovenes, known officially as Jugo-Slavia (S. Slavonic State), Servia originally was bounded N. by Austro-Hungary, E. by Roumania and Bulgaria, S. by Bulgaria and Albania, W. by Albania and Bosnia. Its area was 33,891 sq. m.; pop. (1910) 4,615,567; capital, Belgrade; pop. (1911) 90,890.

Servia proper is divided by the River Morava into two sections. The W. section is broken by the Dinaric Alps, the E. by the Balkans. At Orsova, on the Danube, the Balkans are separated from the Carpathians by a narrow cleft, called the Iron Gates, through which the Danube rushes. From its S. frontier Servia slopes to the N. in a roughly inclined plane, and on the NW. spreads out in level tracts. The soil in the valleys and lower regions is fertile, producing rice, maize, wheat, flax, hemp, and tobacco. Along the Danube are vineyards and orchards, especially of plum trees, whence slivovitza, a sort of brandy, is obtained. More than half the territory is covered with forests. Iron, copper, lead, and coal are found in certain localities. Hogs are exported, and constitute the chief industry and the principal source of revenue. There are practically no manufactures except in a primitive way, as each household supplies its own necessities.

Servia was an hereditary monarchy. The national assembly, or Skuptchina, met annually. The inhabitants belonged to the Eastern Orthodox or Greek Church. Military service was obligatory from the age of twenty-one to fifty-one, and Servia claimed ability to put into the field 5,700 officers, 353,366 men, with 45,100 horses and 402 cannon.

The Servians are a branch of the Slavic family. During the seventh century they were induced by the Byzantine emperor, Heraclius I,

to abandon their homes in the Carpathians and colonize the territory between the Danube and Adriatic. As friends and allies of the Byzantine Empire, they formed an efficient defense against the barbarians. Christianized in the ninth century, Servia became independent in the eleventh, and its sovereign, the Grand Shupane, was recognized by Pope Gregory VII. Stephen Dushan, the tenth sovereign, conquered nearly all the Balkan peninsula, threatened Constantinople, and in 1346 took the title of czar. In 1389, at the terrible battle of Kossova, the Servian king, Lazarus, and Sultan Murad I were slain, Servia lost its independence, and disappears from history till the nineteenth century. Then the peasant, Kara George, aided by Russia, expelled the Ottomans, and ruled from 1804 to 1813. Again the Ottomans overran the country when the swine herd, Milosch Obrenovitch, headed a desperate resistance during fifteen years. Supported by Russian diplomacy he forced the Porte in 1830 to recognize him as Prince of Servia. In 1869 a constitution was framed providing a limited suffrage.

In 1876 Servia declared war against Turkey, and was saved from destruction only by Russia. The Congress of Berlin (1878) recognized Servian independence, and increased its territory at the expense of Turkey. Servia declared itself a kingdom, March 6, 1882. In November, 1885, King Milan made an unjustifiable attack on Bulgaria, but was defeated and his kingdom maintained intact only through the intervention of Austria-Hungary. In 1889 a liberal constitution was granted, all taxpaying citizens becoming electors. Milan I, March 6, 1889, abdicated in favor of his son, Alexander I. The latter in May, 1894, by a coup d'état, abolished the new constitution and restored that of 1869, but in 1903 Alexander and his queen, Draga Machin, were assassinated, and Peter Kargeorgevich came to the throne as Peter I. Servia fought successfully against Turkey and, later, Bulgaria in the Balkan wars, 1912 3. In 1914 Austria-Hungary declared war against her on the ground that a Servian subject had assassinated the Austrian Archduke Francis Ferdinand and his wife, the Duchess of Hohenberg, at Sarajevo, Bosnia, June 28, 1914. Austria began bombarding Belgrade, July 29; Russia, as in duty bound by treaty, came to the aid of Servia; Germany declared war on Russia, Aug. 1; France, under treaty pledges, sided with Russia, and was invaded by the Germans, Aug. 2; and England, after endeavoring to avert war, fulfilled her treaty obligations to France. And so, the World War was on. Old Servia at times seemed irrecoverably crushed, but her gallant army fought on, the Allies gave substantial aid, and the Peace Conference rewarded her with enlarged political and territorial rights, making her the chief part of the new kingdom of JUGO-SLAVIA (*q. v.*).

Service Tree, a rosaceous tree (*Pyrus domestica*) of Europe, Asia, and Africa, much resembling the medlar and sorb tree. Its fruit, when overripened and bletted, is pleasant to eat. It is much cultivated. The wood is hard and valuable, and is used as a substitute for box. In N. America the name is applied to

SERVICE TREE.

the shad tree, and in others to the mountain ash.

Serv'ites, a community of Augustinian friars, called Servants of the Virgin Mary; founded at Florence in 1233. They were confirmed in 1255 by the pope, and in 1493 a part received a reformed rule. There is also a congregation of Servite Tertiaries, and there are a few houses of Servite nuns. The Servites are mostly found in Europe, but have a monastery at Chicago, Ill.

Serv'itudes, in the Roman law, cover not only the easement of the English law, but also life estates in land and life interests in personal property. It is a right to use the property of another outside of contract, but is restricted to such property rights as are enforceable against all the world by actions *in rem*. Servitudes on land, if in favor of an adjacent and "dominant" estate, are termed real or *prædial* servitudes. These are again divided into *rustic* and *urban* servitudes. The former include rights of way, rights of drawing water from or conveying water across neighboring land, etc. Examples of the latter class are rights of light and prospect, right to have a wall or beams supported by the neighbor's wall. The modern European law of real servitudes is substantially Roman. A personal servitude may be established in any property capable of being used without impairment of its substance, *e.g.*, a library or jewels. The usufructuary, who enjoys the usufruct or servitude, must not deteriorate the property, and must give security for its restoration.

Ser'vius Tul'lius, the sixth king of Rome (legendary dates 578–534 B.C.). The account of his life is full of fables and traditions: that he was a son of Vulcan; that he married the king's daughter, and came to the throne by the stratagem of his mother-in-law; that he was killed by the younger Tarquin. To him is attributed a constitution which made landed property the basis of the military system, and

thus admitted the plebeians to a place in the army and a share in the government. He formed an alliance with the Latins, and completed the city by incorporating with it the Quirinal, Viminal, and Esquiline hills, and surrounding the whole with a wall 5 m. in circumference, which was the legal boundary of the city up to the time of Sulla.

Sesame (sĕs'ă-mē), or **Ben'ne Plant,** herbaceous plant (*Sesamum indicum*) belonging to the *Pedaliaceæ*, sometimes annexed to *Bignoniaceæ*, valued for the oil expressed from its seeds. The several varieties are annual Oriental plants, naturalized in most warm climates. Sesame was probably introduced into the U. S. by slaves from Africa. Its rich oily seeds are prized by the negroes, who also make a thick gelatinous drink of the leaves, which is very bland and useful in diarrheas. The oil is called oil of benne and gingelly oil, and in some respects is superior to olive oil.

Sesame Grass (*Tripsacum dactyloides*), of the U. S. growing in moist soil near the Atlantic coast from Connecticut southward, with broad leaves and a solid stem, like Indian corn or sugar cane, which it resembles. It is coarse, and in the N. is not valued, but in the S. and in the W. Indies and Mexico is used as fodder.

Ses'amoid Bones, bones developed in the tendons of muscles, as the patella or kneepan. They are so called from their supposed resemblance to a sesame seed.

Sesos'tris, Greek appellation of Rameses II of the nineteenth Egyptian dynasty, about whom they grouped the deeds of other famous Pharaohs, thus forming a single exaggerated personality. According to the Greek story, Sesostris was reared with 1,700 children born on the same day, and in his youth led victorious expeditions into Ethiopia and Libya. After his father's death he equipped a large army, and, giving the command to his fellow students, marched against Ethiopia and took heavy tribute. He then fitted out a navy, and sailed to the end of the Arabian peninsula, and thence crossing the Indus and conquering India. He subdued the Scythians, and conquered Thrace. He reigned sixty-eight years; divided Egypt into thirty-six nomes or districts; built roads, canals, cities, and temples, using his captives as laborers; was among the great Egyptian lawgivers; introduced the worship of Serapis, and divided the Egyptians into castes, forbidding also that a son abandon the calling of his father. In his old age he became blind, and took his own life.

Sester'tius, in ancient Rome, a silver or bronze coin worth one fourth of a denarius. Originally, it was worth two and a half asses, but in later times four asses made one sestertius, and the coin, originally of silver, was struck in fine bronze. The sestertium was a money of account equal to 1,000 sestertii, but it was never coined. The value of the sestertius, roughly, was from one and a half to five cents of U. S. money, for the value declined after the fall of the republic.

Se'ti, name of the first and fourth kings of the nineteenth Egyptian dynasty. SETI I, son of Rameses I, ruled about twenty-seven years, reëstablished the worship of Amon, was a patron of art, and left his name on many monuments, some doubtless usurped. Manetho, for reasons unknown, begins with Seti I a new dynasty. Seti I fought against the Bedouin and the tribes of Palestine and Syria, including the Hittites. He overcame the Libyans, who enlisted as mercenaries under him and his successors till, four hundred years later, the Libyan Shishak usurped the throne and founded a new dynasty. The name of SETI II is found on various small objects and upon the monuments of his predecessors, which he usurped. The famous "Tale of the Two Brothers" (resembling the story of Joseph and Potiphar's wife) was prepared for his edification.

Set'-off, a cross demand existing in favor of a defendant may sometimes be interposed as a defense, either partly or wholly defeating recovery by the plaintiff or even resulting in a recovery against him. Set-off should be discriminated from recoupment, although it is often difficult to say in which form the opposing demand should be set up as a defense. Counterclaim has a broader meaning, ordinarily including both set-off and recoupment.

Se'ton, a twist of silk or other material, formerly passed through a fold of skin as a counterirritant. They are not now employed.

Set'ter, a hunting dog intermediate between the pointer and the spaniel; formerly trained to sit or drop when marking down game, but at present it stands at its work like a pointer.

SETTER.

There are several distinct strains, as the Irish and the English setters. Notable among new stocks are the Gordon, the Macdona, and the Laverack. The colors vary, but a liver color is a favorite one.

Set'tlement of Dece'dents' Estates'. If the decedent left a will, it must be probated, either by the party in possession of it or by the party entitled to it. A will is *probated* when it has been established by the testimony of subscribing witnesses at the time the will is admitted to record; and it is said to be *admitted to record* when a copy of it, with the

order of the court admitting the same to probate, is properly recorded. The decedent who has made a will is called a *testator* if a male, or a *testatrix* if a female. If the maker of a will has appointed a person to carry his will into effect and settle his estate (called an *executor* or *executrix*), such person is usually vested with such control over and title to the decedent's estate as is specially provided for in the will. If no executor is appointed by the will, *letters of administration with the will annexed* may be issued to an administrator to settle the estate. If an estate has been settled in part only, then a person is appointed to settle the remainder of the estate called an *administrator de bonis non*, or if he be appointed upon a will an administrator *de bonis non* with the will annexed. If the decedent left no will, the court will appoint an *administrator* or *administratrix* to settle the estate, which is called an intestate estate. In general, the right to administer an estate belongs to the oldest and nearest male relative, first to the next of kin and afterwards to collateral relatives.

Set-Ty'phon, an Egyptian deity; the son of Seb and Nut, brother of Osiris, Isis, and Nephthys, the last being also his wife. He stood for the evil power of the sun's heat, and in general represented evil and harm, just as Osiris was the type of all that was good and beneficent. The worship of Set was very ancient, dating from the fifth dynasty at least, and his principal sanctuary was at Ombos in upper Egypt, where he was regarded as the lord of the South. As Osiris was revered out of hope, Set held his worshipers through fear. Set was not only a foreign god, like Baal, but came to be regarded as the god of the foreigners, and the honor paid to him gradually ceased, till general detestation led to the erasure of his name from monuments and the destruction of his images. Set was represented in the hieroglyphics as an ass-headed figure, with a forked tail in a vertical position. The ass, crocodile, and hippopotamus were sacred to Set, and red-haired men were under his special protection.

Seul. Same as SEOUL (*q.v.*).

Sevasto'pol, or Sebas'topol, seaport and fortress near the SW. of the Crimean Peninsula in the Black Sea. It was a Tartar village (Akhtiar) till 1780, when a naval arsenal was established here. The fortifications were considered impregnable when (September, 1854) the armies of Great Britain and France commenced the siege. The magnitude of the defenses was enormous, 5,000 men being engaged on them during eleven months. The garrison was about 30,000, and 800 guns were mounted at the final assault. The forces engaged were: French, 120,000; British, 27,000. The French lost 44,500, and the total loss of the allies was about 60,000. The Russians lost 84,000. The fortifications were after the capture destroyed, and by the Treaty of Paris Russia was debarred from maintaining an effective naval force in the Black Sea; but this restriction was removed in 1871. Sevastopol has been rebuilt, and is now a watering place and Russia's S. naval headquarters. Pop. (1908) 67,752. See CRIMEAN WAR.

Sev'en Pines, Bat'tle of. See FAIR OAKS.

Seven Sa'ges, or Wise Men, of Greece. Their names and aphorisms are variously given, but according to most authorities they were: Bias of Priene, "Too many cooks spoil the broth"; Chilon of Sparta, "Know thyself"; Cleobulus of Rhodes, "Moderation is the chief good"; Periander of Corinth, "Use forethought in all things"; Pittacus of Mytilene, "Know your opportunity"; Solon of Athens, "Nothing in excess"; and Thales of Miletus, "Suretyship brings ruin."

Seven Sleep'ers, seven Christian brothers of Ephesus who, during the persecution of Decius (251), took refuge in a cave, the entrance of which was walled up by the heathen. There they slept miraculously until 447. Then they awoke, told their story—among others to the Emperor Theodosius II—and died after having thus confirmed the faith of the Christians. The Roman Catholic Church commemorates them on July 10th. This legend can be traced as far back as the sixth century. It is told by Mohammed in the Koran. Kindred tales are found in the folklore of the East.

Sev'enteen-year Lo'custs. See CICADA.

Sev'enth-day Ad'ventists. See ADVENTISTS.

Seventh-day Bap'tists. See BAPTISTS.

Seven Up', All-fours, or Old Sledge, a game at cards designed for two players with a full pack, the cards ranking as in whist. Six cards are dealt each player, three at a time, and the next is turned up. If the nondealer is dissatisfied with this for trump he "begs," and the dealer must either add one point to his opponent's score or lay the turned card aside and deal three more to each player, turning the next card for trump; but if this be of the same suit as before he must lay it aside and deal three more to each, and so on until a new trump is turned. The eldest hand leads first, and thereafter the winner of the trick. A player must follow suit if he can, or he may trump. One point is scored for (1) playing the highest trump (*high*), (2) playing the lowest trump (*low*), (3) turning up a knave or taking the knave of trumps (*jack*), and (4) taking the most valuable cards (*game*), counting here each ten as 10, ace 4, king 3, queen 2, and knave 1. The first to score seven points wins; in the last hand the points are scored in the order given above (not in the order in which they are made), except that the point for turning a knave is scored when it is turned. This game is much played, and from it many others have been derived by modifications and additions, as California jack, pedro, cinch or double pedro, draw pedro, and pitch.

Seven Wise Men. See SEVEN SAGES.

Seven Won'ders of the World, generally given as The Colossus of Rhodes (see CHARES), Diana's Temple at Ephesus (see DIANA, TEM-

PLE OF), the Mausoleum at Halicarnassus (see MAUSOLEUM), the PYRAMIDS (*q.v.*), the Pharos at Alexandria (see LIGHTHOUSE), the HANGING GARDEN OF BABYLON (*q.v.*), and the colossal gold and ivory statue of Zeus, by Phidias, at Olympia.

Seven Years' War, a contest involving the principal European powers from 1756 to 1763, and extending to the four quarters of the globe. Maria Theresa, forced in the Treaty of Dresden (1745) to confirm Frederick the Great in the possession of Silesia, hoped to recover it. By flattering Mme. de Pompadour she gained over the French court. George II, involved in the French and Indian War, to protect his Hanoverian dominions concluded an alliance with Frederick and paid subsidies to him. Elizabeth of Russia, whom Frederick had provoked by his satire, Augustus III of Poland and Saxony, the mass of the German states, and Sweden joined Austria and France. The Prussian king, seconded by his brother, Prince Henry, Schwerin, Seydlitz, Ziethen, and others, was opposed to the Austrian commanders Daun, Laudon, Browne, and Charles of Lorraine, and to the Russian generals Apraxin, Fermor, Soltikoff, and Tchernitcheff.

In W. Germany, where the Duke of Cumberland was unable to cope with the French, the glory of the Prussian arms was sustained by Duke Ferdinand of Brunswick against Soubise, Broglie, and others at Crefeld (June 23, 1758), Minden (August 1, 1759), and elsewhere. Still, Frederick was on the point of being overwhelmed when he was saved by the death of Elizabeth (January 5, 1762). France, though successful in America in the beginning, was stripped of her colonial power. Louisburg (1758), Quebec (1759), Guadeloupe (1759), Martinique (1762), and other W. India islands were lost. Hawke defeated the French fleet off Quiberon, 1759, and Belleisle was taken 1761. Clive humbled the French power in India. On the African coast the English were equally successful. Choiseul, in 1761, in vain concluded the "family compact," which united the branches of the Bourbons. While Charles III of Spain unsuccessfully attacked Portugal, the English reduced Havana (1762) and held the Philippines. The war was terminated by the Treaty of Paris (February 10, 1763) between England, France, and Spain, and by that of Hubertsburg (February 15, 1763) between Prussia and Austria. Silesia remained in possession of Frederick. England retained her Canadian and a portion of her W. Indian conquests, as well as those on the river Sénégal, and acquired Florida from Spain, to whom as a compensation France ceded Louisiana.

Severi'nus, Saint, the apostle of Noricum; b. in Italy in the fifth century; adopted a life of asceticism. He visited Pannonia, but settled in Noricum, a Roman province comprising the present Austria, Styria, Carinthia, Carniola, and Tyrol. He died at Faviana, near the present Vienna, January 8, 482.

Sev'ern, next to the Thames the largest river of England, 210 m. long, rising in Wales, flowing generally NE., S., and SW., and falling into the Bristol Channel 10 m. SW. of Bristol. It is navigable 178 m.

Seve'rus, Alexander. See ALEXANDER SEVERUS.

Severus, Septimius, 146–211 A.D.; Roman emperor (193–211 A.D.); b. near Leptis in Africa; married Julia Domna. While commander in chief in Illyria and Pannonia he was proclaimed emperor by his troops. He deposed Julianus and crushed the rival claimants, Pescennius Niger and Clodius Albinus; captured Byzantium (197) after a siege which lasted three years; invaded Parthia and captured Ctesiphon; from 203–207 remained peacefully at Rome, where he remodeled the Pretorian Guards; then called to Britain to repress rebellion and marched the length of the island, subduing the Caledonians; died at Eboracum (York) in 211, his death being hastened by the unnatural conduct of his son Caracalla.

Severus, Sulpicius. See SULPICIUS SEVERUS.

Severus, Wall of, a wall of stone partly built or repaired by Severus in 208 A.D. to protect Roman Britain from the Caledonians. It was originally erected by Hadrian. It extended from the Solway to the Tyne immediately N. of the wall of Hadrian and S. of that of Antoninus. Considerable portions still remain. See HADRIAN'S WALL.

Sevier (sĕ-vēr'), **John,** 1745–1815; American pioneer; b. Virginia; explored the Holston River and was foremost in fights and negotiations with Indians. In 1785 was Governor of the State of Franklin (W. N. Carolina and E. Tennessee); in 1796, first Governor of Tennessee.

Sevier Lake, body of very salt water in W. Utah, of variable size. It once formed part of a vast inland sea. See BONNEVILLE, LAKE.

Sévigné (sā-vēn-yā'), **Marie de Rabutin Chantal** (Marquise de), 1626–96; French writer; b. Paris; left an orphan very early, but received an excellent education, and married, 1644, the spendthrift, Marquis Henri de Sévigné (d. 1651), to whom she bore a son and a daughter. She was rich, spirited, beautiful, one of the most prominent members of the literary circle of the Hôtel Rambouillet, and on intimate terms with all the principal actors in the civil war of the Fronde. In 1669 her daughter was married to the Marquis de Grignan, Governor of Provence; the consequent separation occasioned a correspondence which, although not intended for publication, appeared after the death of the authoress, and has made her name celebrated, the letters being of great historical interest and of the highest literary merit.

Seville (sĕv'il; Spanish, sā-vēl'yā), capital of province of Seville, Spain, on the Guadalquivir, 70 m. from its mouth. Under the Romans, Goths, and Moors, it was the capital of wealthy and powerful empires. The earlier kings of Spain resided here, and when America was discovered it became the mart of the new colonies. During the French invasion (1810–13) it was pillaged, but recovered, and is now an enterprising modern town. Across the city runs the

Alameda, a broad street lined with palaces. The rest of the city consists mostly of narrow streets lined with high, somber-looking but substantial houses of Moorish construction. The cathedral is one of the greatest Gothic structures in the world, 431 ft. long, 315 ft. wide, and 145 ft. high under the dome, and magnificently adorned. Among the manufactures of Seville are an immense cigar factory. Its chief exports are oranges, olive oil, wine, wool, cork, copper, lead, and quicksilver. As Sèville was held by the Moors for five centuries, and entirely rebuilt from the materials of Roman edifices, it became a purely Moorish city, and preserves that character, though the tortuous streets are giving way to broad boulevards. Pop. (1900) 148,315. The province of Seville occupies the lower valley of the Guadalquivir, bounded W. by Huelva and S. by Cadiz; area, 5,428 sq. m.; pop. (1900) 555,256.

Sèvres (sāvr), town in the department of Seine-et-Oise, France; on the Seine; 10½ m. SW. of Paris; celebrated for its porcelain, acknowledged to be the most elegant in design and painting. Pop. (1901) 8,216.

Sèvres, Deux (dė), department of W. France; named from two rivers—the Sèvre-Niortaise, which flows into the Bay of Biscay, and the Sèvre-Nantaise, which joins the Loire. Area, 2,317 sq. m. The N. part is hilly, even mountainous; the S. level. The soil is fertile. Cattle and horses are reared. Iron, marble, and granite are found, and many manufactures are carried on. Pop. (1901) 342,474; capital, Niort.

Sew'ard, Anna, 1747–1801; English authoress. Her poetical works consist of "Louisa," a metrical novel, and "Sonnets." Her elegies on Capt. Cook and Major André had great celebrity. She was called "the swan of Lichfield." Sir Walter Scott edited her literary remains.

Seward, William Henry, 1801–72; American statesman; b. Florida, N. Y. He settled as a lawyer at Auburn in 1824, and in 1830 he was elected to the state senate as an antimason. In 1834 he was the Whig candidate for governor, and was defeated; but elected in 1838, and reëlected, 1840. He was U. S. Senator, 1849–61, and the leading supporter of Pres. Taylor. He avowed a determination to make no further concessions to the slave power, and was denounced as a dangerous agitator. In a speech on the admission of California, March 11, 1850, he said, in reference to the effort to legalize slavery in the national domain: "There is a higher law than the Constitution, which regulates our authority over the domain." The phrase "higher law" was the subject of much comment, and was urged as a ground of reproach by his political enemies. His speeches on the repeal of the Missouri compromise and the admission of Kansas in 1854–55 were widely circulated.

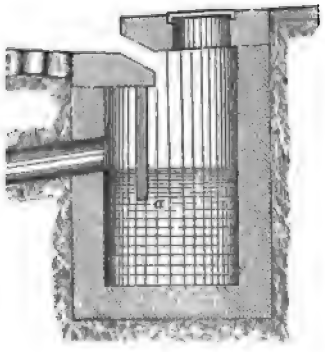
In 1858 he characterized the antagonism between free and slave labor as "an irrepressible conflict between opposing and enduring forces." In 1860, as in 1856, many Republicans favored his nomination for the presidency. In the convention, on the first ballot, he received 173½ votes; Lincoln, the next highest, 102—233 being necessary for a choice. Lincoln having been nominated, Seward canvassed the W. states in his behalf, and became his Secretary of State. Seward apparently failed at first to apprehend the magnitude of the secession movement, and he favored as a peace measure the evacuation of Forts Pickens and Sumter. During the war his management of foreign affairs was politic and effective. On Lincoln's reëlection Seward continued as Secretary of State. Early in 1865 he was thrown from his carriage, and his jaw and one arm were broken. While thus confined to his bed, on the night of the assassination of Lincoln, April 14th, one of the conspirators penetrated to Seward's room and struck him several blows with a knife, from which his recovery was slow and painful. Seward was retained by Pres. Johnson, and favored his reconstruction policy. March, 1869, Seward retired from public life, and, 1870–71, made a tour around the world.

Sew'erage, a system of sewers or underground channels for carrying off the sewage or liquid refuse and the storm water of a locality. Where dwellings are far apart, as in country districts, the liquid wastes from the house may be safely disposed of on the soil by very simple means; but in towns there is no available open ground in the vicinity for such disposal, and sewers become a necessity. In towns where there are no sewers the sewage is run into cesspools, where it decomposes, contaminating the earth, air, and water in the vicinity, and becomes the disseminator of disease. To provide for the prompt and rapid removal of this sewage is the object of sewerage. The requisites for a sewer are that it be so constructed as to carry the sewage to its outfall with the least possible delay; that it be smooth on its interior surface, so as not to retard the flow of sewage and afford no lodging place for the solid particles; that it be watertight.

In the ruins of Babylon and Nineveh and of the ancient cities of Egypt are the remains of systems of sewerage. Exploration has brought to light the extensive sewers of ancient Jerusalem, and the Cloaca Maxima in Rome still fulfills the purpose for which it was constructed twenty-five centuries ago. During the dark ages sanitary works were neglected, but fatal epidemics and plagues brought thinking men to realize the necessity for attending to matters relating to the public health. Sewers designed to carry both the liquid wastes and the storm water are called combined sewers. Those designed to carry only the sewage are called separate sewers.

In the separate system, also called the Waring system, the first thing to be determined is the size of the sewers. The proper size depends upon the number of people contributing sewage to it, the amount of sewage per day for each, the maximum rate of discharge, and the form, grade, and interior surface of the sewer. The volume of sewage to be provided for per day may be taken as equal to the volume of water supplied. U. S. statistics show that the use of water varies in different cities from 25 to 175 gal. per day per capita, and that the amount used is increasing. In many cases the increase

has been 100 per cent in twenty years. The daily maximum of water consumption is from five to seven o'clock A.M. The maximum daily consumption for the week is on Monday. Taking the whole year into consideration, there are two daily maxima. One during the coldest weather in winter, and the other in the hot, dry weather in summer. Any unnecessary size is a serious detriment to the efficient working



Cross Section of Catch Sewer.

of the sewer, as it decreases the depth and velocity of flow. The minimum velocity to prevent deposit varies with the size of the sewer, and is from 2 to 3 ft. per second.

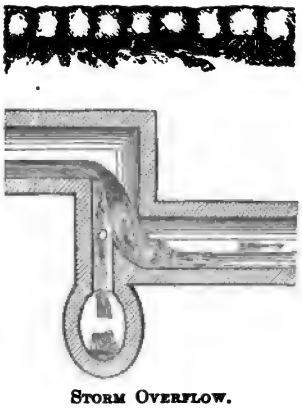
The best material thus far produced for sewers up to 2 ft. in diameter is salt-glazed, vitrified, earthenware pipe, which has a smooth surface and is impervious to moisture, is not affected by sewage, and does not deteriorate with time. It is made of all sizes up to 2 ft., and special forms are manufactured for certain purposes. It is usually made of cylindrical form, and in lengths of 2 or 3 ft. In the usual form each length has a bell, or socket, at one end to hold the spigot end of the adjoining piece in laying. This is called the bell and spigot joint.

Sewers more than 2 ft. in diameter are usually built of hard-burned brick, laid in hydraulic cement. All junctions for lateral branches and house connections should be put in when the sewer is built, as much better workmanship can then be secured in making the connections, and with less danger to the sewer. The minimum depth is usually 6 to 8 ft.

Manholes are masonry shafts extending from the sewers to the surface of the ground, and large enough to admit a workman to inspect or clean the sewers. They are usually formed of an 8-inch brick wall. Manholes should be placed at the junctions of the laterals with the mains, and at changes of direction in the line of sewers. Where the ground water needs to be removed as well as the sewage, special provision must be made. A sewer should be water tight, while a water-tight conduit would be of no use as a drain. The drainage may be laid beside the sewer pipe or under it or over it. In determining the size necessary in any case, the disposal of the storm water is the only question to be considered. If a sewer has an approximately constant flow and is to run half full or more, the best form is circular. In combined sewers, however, the ordinary flow of sewage usually fills but a small part, and in that case the egg-shaped section with the small end down is best. This concentrates the flow so that the depth and velocity may be kept as great as possible at its minimum, and by expanding in the upper part provides for the greatly increased amount delivered to the sewers by storms. The manholes for the combined system differ from those in the separate system only in resting on the sewer itself instead of a concrete foundation. The construction of the manhole begins at the springing line of the upper arch of the sewer.

Catch Basins.—The storm water in passing over the surface of the streets and along the gutters carries with it dirt, pieces of stone and brick, leaves, sticks, and other refuse. In order to keep this débris out of the sewers the storm water is first received into a catch basin, where the solid matter is held and the water passed on into the sewer. The opening into the sewer should be several feet from the bottom, and should be so arranged as to guard against admitting any of the solids from the catch basin. So long as the water in the catch basin is above the bottom of the partition *a*, the gas from the sewer cannot escape. Sometimes the outlet to the sewer is trapped.

Catch basins should be cleaned frequently, and placed at the lowest points, and from 200 to 300 ft. apart on both sides of the street. In order to keep sewers in the best possible condition and reduce the evolution of sewer gas to a minimum, provision should be made for flushing and ventilation. Separate sewers are best ventilated by continuing the house drains, untrapped, above the roofs of the houses, either inside or outside of the house. The difficulties in the way of flushing and ventilating large sewers are almost insurmountable. After the sewage has been carried away, it may be dis-



Storm Overflow.

charged without purification into a stream or large body of water; it may be partly purified by subsidence, or filtration, or chemical process, or by a combination of these, and then discharged; or it may be purified by application to the soil in several ways.

The action of the soil in purifying sewage is complicated. It filters out the suspended particles, and the organic matter in the sewage is

destroyed by oxidation and by the bacteria in the soil. The effluent water is collected by drain tile and delivered to the natural water courses.

Sew'ing Machine', machine for stitching fabrics, operated by the foot, hand, or other motive power. In 1790 Thomas Saint, an Englishman, obtained a patent for a machine intended for "quilting, stitching, and sewing, making shoes and other articles," which had a feed for moving the material after each stitch to the proper distance for the next, and tensions above and below it. It made a chain stitch, the continuous thread being pushed by a notch-ended needle through a hole made by an awl, and the needle was then withdrawn, leaving a loop of thread below the material which was taken up by the next loop and drawn tight.

The first sewing machine that was made for sale was patented in France in 1830, and in a modified form in the U. S. in 1850. Its inventor, Barthélemy Thimonier, constructed of wood eighty machines which made a chain stitch of such strength that they were used in 1830 on army clothing. These machines were destroyed by a mob which feared they would deprive tailors of their bread. Later Thimonier had other machines constructed of metal, which were driven by a treadle and cord. These were also destroyed. Thimonier's machine had the overhanging arm, flat cloth plate, vertical post, vertical reciprocating needle, continuous thread, and a presser foot. The invention of the lock stitch has been claimed for Walter Hunt, who, 1832–34, made a sewing machine in which he used an eye-pointed needle attached to the end of a vibrating arm. But it is conceded that the machine of Elias Howe, Jr., was independently devised; and as it formed the basis upon which improvements were made, and obtained the first patent, he has been accredited as the originator of the lock-stitch machine. Howe's machine, patented in 1846, used a grooved and curved eye-pointed needle, carried upon the end of a vibrating arm, which, passing through the cloth, formed a loop through which a shuttle passed another thread. The needle moved horizontally, the cloth being held in a vertical position by pins projecting from a baster plate, which was moved intermittently by a toothed wheel. On reaching the end of the plate, the machine was stopped, the baster plate returned to its original position, and the cloth again attached. This construction prevented the successful use of the machine, but the patents were drawn so skillfully that Howe received nearly $2,000,000 in royalties from other makers. One serious lack of the Howe machine was a device by which the cloth could be moved so as not to interfere with the needle. Such a device is called the "feed," and was sought for a long time.

The A. B. Wilson "four-motion-feed" device consists in moving a serrated bar, in a slot in the horizontal plate upon which the cloth is fed, in the direction of the four sides of a parallelogram. The teeth carry the cloth forward while moving horizontally a short space above the surface of the plate; the bar then drops (the second motion), then passes backward horizontally beneath the plate (the third motion), and rising brings the teeth through the slot and above the surface (the fourth motion). The motion which carries the cloth forward is so timed as to take place while the needle is raised above the cloth, and never to interfere with its passage. In September, 1850, Isaac M. Singer, a mechanic of New York, made a contract to invent an improved sewing machine, and have it built for $40. He accomplished this within twelve days, and the machine was found to be practical and efficient. This machine was the first which had the rigid overhanging arm to guide the vertical needle, in combination with a shuttle and what was called a wheel feed.

The buttonhole sewing machines do their work in a thoroughly efficient manner, the buttonhole finished by it being much more durable than those made by hand work. Buttonhole attachments are intended to be used in connection with an ordinary lock-stitch sewing machine; they not only make a perfect buttonhole, but will also make the buttonhole stitch on the edges of garments, shoes, etc., which the buttonhole machine cannot do. There is a large variety of sewing machines made for special work, as the cylinder sewing machine, having a cylindrical work holder, for sewing seams on sleeves, trousers, water hose, boot legs, leather buckets, and other articles of tubular form; and the carpet sewing machine, for making up carpets. The 1900 census shows sixty-five factories of sewing machines in the U. S., with an annual output valued at $21,129,561.

Sexage'sima. See SEPTUAGESIMA.

Sex'tant, astronomical instrument, invented by Newton, and reinvented by Thomas Godfrey, of Philadelphia, in 1730, and John Hadley, of England, in 1731, using for the measurement of an angle a graduated arc of the sixth part of a circle. If a ray of light be reflected by each of two plane surfaces, the deviation of the axis of the pencil of light is double the inclination of the reflecting planes, supposing its course to be in one plane perpendicular to the intersection of the surfaces.

In Fig. 1, let I be the index glass, H the horizon glass, S the star, S I H E the pencil of light from the star S as it suffers the two reflections at the respective glasses. The star will be seen by the eye projected in the line E S'. But H E I is the deviation of the pencil produced by the double reflection, and we see this angle is twice the angle of the inclination of the mirrors. So long as the line of sight E S' is directed to any fixed point the angular distance to any other point may be determined by the revolution of the mirror at I; the angle through which this mirror is moved may be indicated by the revolution of the line a A, which carries at some part of it an index sweeping over a graduated arc, which is graduated to twice as many degrees as it measures in its own circumference.

Figure 2 represents the common form of the sextant. The frame is of brass, to combine strength with lightness; the graduated arc, inlaid in the brass, is usually of silver, sometimes

of gold or platinum. The divisions of the arc are usually 10′ each, which are subdivided by the vernier to 10″. The handle, H, by which it is held in the hand, is of wood. The mirrors, M and *m*, are of plate glass, silvered. To give

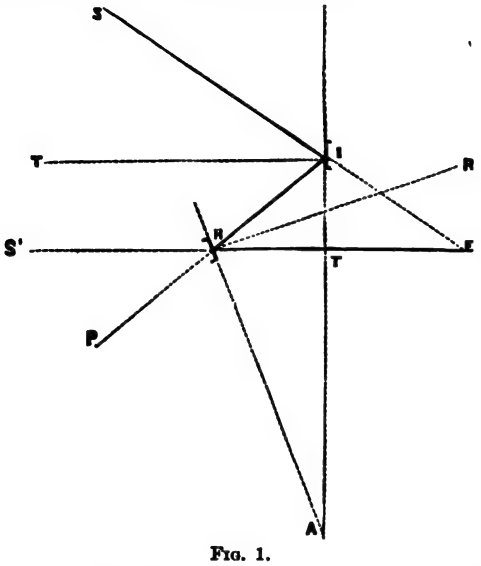


Fig. 1.

greater distinctness to the images, a small telescope, E, is placed in the line of sight *m* E. The motion of this telescope changes the plane of reflection, which, however, remains always parallel to the plane of the sextant. The vernier is read with the aid of a glass, R, attached

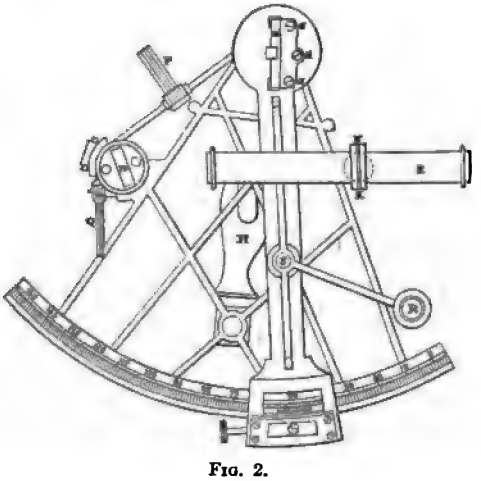


Fig. 2.

to an arm which turns upon a pivot, S, and is carried upon the index bar. The index glass, M, or central mirror, is secured in a brass frame, which is firmly attached to the head of the index bar by screws, *a a a*. This glass is generally set perpendicular to the plane of the sextant by the maker, and there are no adjusting screws connected with it. The fixed mirror *m* is usually called the horizon glass, being that through which the horizon is observed in taking altitudes. It is usually provided with screws, by which its position with respect to the plane of the sextant may be rectified. At P and Q are colored glasses of different shades, which may be used separately or in combination, to defend the eye from the intense light of the sun.

For astronomical purposes the sextant is sometimes modified by making the arc a complete circle. The instrument is then known as a reflecting circle. This form has the advantage of securing higher precision in the observations.

Sex'ual Selec'tion, a factor in evolution, in which there is a struggle of the individuals of one sex for the possession of the other. In the struggle for existence the less fitted perishes; in sexual selection the unfortunate one is left without offspring. Usually the struggle is between the males, and may take the form of actual battle, but not infrequently it is one in which the æsthetic senses seem to be important. See Evolution; Reproduction.

Sexual Spore. See Spore.

Seychelles (sā-shĕl′), a group of over thirty small islands in the Indian Ocean, belonging to Great Britain, and since 1903 a separate colony; area, 148 sq. m. They are rocky and high, covered with luxuriant vegetation. Cotton is cultivated. Exports: vanilla, cocoanuts, guano, etc. The largest is Mahé, 56 sq. m.; capital, Victoria. The Seychelles were discovered by the Portuguese in the sixteenth century; settled by the French, 1756, and became a British possession, 1794. Pop. (1906) 21,781.

Seymour (sē′mûr), **Horatio,** 1810–86; Governor of New York; b. Pompey, N. Y.; admitted to the bar, 1832, but withdrew to manage the large estate he inherited from his father; elected to the state assembly as a Democrat, 1841, and three times reëlected Speaker in 1845; unsuccessful candidate for governor, 1850; governor, 1853–55; vetoed a prohibitory liquor law, and defeated by the Prohibitionist candidate, 1854; again elected governor as a war Democrat, 1862; suppressed the riots in New York, and rendered efficient coöperation in the war for the Union; defeated for reëlection, 1864, and presided over the National Democratic Convention at Chicago, and at New York, 1868, when he was nominated for the presidency much against his will, and received eighty electoral votes.

Seymour, Lady Jane, abt. 1510–37; third queen of Henry VIII, daughter of Sir John Seymour; maid of honor to Queen Anne Boleyn; married Henry, May 20, 1536, the day after the execution of Anne, and died after giving birth to a son (Edward VI); chiefly notable for her sympathy with the Reformation.

Sfax (sfăks), probably the *Taphoura* of Ptolemy, fortified city on the Gulf of Gabes, or Lesser Syrtis, Tunis. The commerce is large, chiefly with France, Italy, Great Britain, and Greece. Sfax is celebrated for its camels,

sponges, and gardens. It is intensely Mohammedan, and is much admired in Arabic literature. Pop. abt. 15,000, of whom from 2,000 to 3,000 are Jews and Europeans.

Sforza (sfôrt'sä), an Italian family which ruled Milan as a dukedom in the fifteenth and sixteenth centuries and influenced the politics of Italy by their ambition, which was generally accompanied with violence and faithlessness, and by their talent, not always accompanied with education, though several members showed interest for and gave protection to science, poetry, and art. The founder of the family was (1) GIACOMUZZO ATTENDOLO, 1369–1424, a peasant boy from Cotignola. Distinguished by his bodily strength, he received the surname *Sforza*, the forcer; chief of a band of condottieri, he entered the service of Queen Joanna II of Naples, who made him grand constable; then served Pope Martin V, who made him a count. (2) His son, FRANCESCO, 1401–66, was chief of mercenaries, and served the highest bidder. He invented a tactical trick which made his troop very effective; entered the service of Visconti, Duke of Milan, and was very successful; received Visconti's daughter Bianca in marriage, and Cremona as her dowry; and took Ancona from the pope. In 1447 Visconti died without male heirs, and Milan instituted a republic; but in 1450 Francesco seized the ducal crown, defeated his adversaries, reigned well, and died beloved by his subjects. (3) His son, GALEAZZO MARIA, 1444–76, was vicious and cruel, and was assassinated.

(4) In 1480, LODOVICO THE MOOR, 1451–1510, a brother of Galeazzo Maria, assumed the regency. He poisoned his nephew, Giovanni Galeazzo (a son of Galeazzo Maria) and ascended the ducal throne himself. As Giovanni Galeazzo had married a Neapolitan princess, Naples remonstrated against the usurpation, whereupon Lodovico induced Charles VIII of France to assert his claim on Naples. The success of the French, however, alarmed him more than the threats of Naples, and he formed a league of the N. Italian states against France. To punish him, Louis XII invaded his country, captured him in 1500, and confined him in a castle of Loches, where he died. He was possessed of great talents and literary and scientific accomplishments, and the encouragement he gave to literature and art made him popular; but he was a weak character, of low morals, and all his astuteness and cunning were of little avail on account of the violence of the time. (5) His son, MASSIMILIANO, b. 1491, was made duke in 1512, but became a pensioner of France. (6) His brother, FRANCESCO II, 1492–1535, was made Duke of Milan by Charles V in 1522, but rendered himself unpopular by oppressive taxes, and at his death the country was incorporated with Austria.

Shabbatai Tsevi (shäb'bĕ-thī tsĕ-vē'), 1626–76, the most noted of the impostors and self-deluded aspirants to be the Messiah of the Jews; b. Smyrna; followed the mystic Cabbala, and became an ascetic. The air was full of Messianic ideas, the year 1666 being looked forward to by both Christians and Jews. Having divulged his intentions in 1648 he was banished; went to Salonica, Morea, Athens, Cairo, and Jerusalem, and achieved success, largely due to the circumstances in which his brethren lived and to the active assistance of his wife Sarah; of Raphael Chelebi, a rich Jew of Cairo; and of Nathan of Gaza, who pretended to be Shabbatai's Elijah. In December, 1665, Shabbatai was officially proclaimed Messiah. Jews all over Europe believed in him, even deified him. In 1666 Shabbatai went to Constantinople, where he was imprisoned. September 14th he saved his life by becoming a Mohammedan. He was a Mohammedan to his captors and a Jew to his followers. The Turks soon tired of this. He was banished to Dulcigno in Albania, where he died. Even after his death the movement continued; there are still secret believers in his Messiahship, as the Dönmēs or Mamin in Salonica.

Shack'leton, Ernest H., 1869– ; lieutenant in British navy. Accompanied Capt. Scott on an expedition to the S. pole, 1901–4. In July, 1907, he left England on the *Nimrod*, at the head of a polar expedition, and in January, 1908, reached Cape Royds, and made his headquarters at the same base, near the volcano, Mt. Erebus, used by the Scott expedition of 1901–4. He had with him at this point 15 men, dogs, Siberian ponies, motor cars, and other equipment. With three companions he reached on January 9, 1909, lat. 88° 23′ E., lon. 162° S., the most southerly point ever reached. Here they hoisted the union jack, presented to them by the queen, 111 nautical miles from the S. pole. Knighted in 1909.

Shad, fish of the family *Clupeidæ*. The species are all inhabitants of the N. hemisphere, and anadromous, like the salmon, living for the greater portion of the year in the sea, but in the spring ascending the rivers in large schools for the purpose of spawning. The eggs are moderate in size, the ovaries of a single female having generally about 25,000 eggs, although sometimes 100,000 to 150,000. They

AMERICAN SHAD.

are discharged near the surface, and sink to the bottom. The time between impregnation and hatching varies from three to six days, according to temperature. The best-known species are *Alosa vulgaris* and *A. finta* of W. Europe, *A. sapidissima*, ranging from the Miramichi to the Alabama, and the *A. reevesii of China*, which especially ascends the Yang-tse-Kiang. The European species are held in much less esteem than the American and Asiatic. The last are esteemed among the

best of fishes, and their ovaries are also regarded as objects of luxury. The shad fishery is a large industry, and in the early spring fishermen are engaged in their capture by fixed nets as well as seines, and to a small extent by dipnets. Shad eat little or nothing when in fresh water, but sometimes rise to the fly. In the salt water and estuaries they feed chiefly on small crustaceans.

Shad'dock (also called *pompelmoose*, *pomelo*, and *grapefruit*), fruit of the *Citrus decumana*, a small tree of the orange family (*Rutaceæ*). It has a watery pulp, cooling, acid, aromatic, and somewhat bitter. The fruit attains 10 to 14 lb. It is used for preserves, and is in

SHADDOCK.

growing favor as a table fruit. It was named from one Shaddock, who is said to have carried it from India to Jamaica. The pomelo is a smaller variety of finer taste. The tree is a native of Polynesia, but is widely spread in the tropics. Said to have been the forbidden fruit of the Garden of Eden.

Shad'ow Bird, a wading bird (*Scopus umbretta*) related to the storks and herons, found in Madagascar and Africa. It is named from its color, a deep brown with bronze reflections. The bird is rather sluggish. Although only 20 in. in length, it builds a hollow nest 6 ft. in diameter, on a tree or ledge.

Shad'well, Thomas, abt. 1640–92; English dramatist; b. Norfolk; acquired reputation by his comedy, "The Sullen Lovers"; was author, among many other plays, of "The Virtuoso," "Lancashire Witches," "The Squire of Alsatia," and "Volunteers, or The Stock-jobbers." He became poet laureate and royal historiographer, 1688, succeeding Dryden in both posts, and was unjustly impaled by that poet as the hero of "Mac Flecknoe" in the character of "monarch of dullness."

Shaft'er, William Rufus, 1835–1906; American military officer; b. Galesburg, Mich.; for many years a farmer. In the Civil War he rose to the rank of colonel and brevet brigadier general; lieutenant colonel in the regular army, 1866; colonel, 1879; brigadier general, 1897; major general of volunteers, May 4, 1898. He commanded the U. S. army at the siege of Santiago de Cuba, which he occupied July 17, 1898, the Spanish army having surrendered. Retired, 1901.

Shaftesbury (shâfts'bẽr-I), **Anthony Ashley Cooper** (first Earl of), 1621–83; English statesman. In the civil war he first supported Charles I, but in 1644 fought for the Parliament. He was a member of Cromwell's parliaments, and was appointed one of the council of state. He retired from the council in 1654, was active in the restoration of Charles II, and was appointed Chancellor of the Exchequer, and a privy councilor. In 1661 he was made Baron Ashley, and in 1667 joint commissioner of the treasury, being a member of the Cabal ministry. (See CABAL.) He was a grantee of the province of Carolina, and with his secretary, John Locke (*q.v.*), prepared its aristocratic constitution. In 1672 he was created Earl of Shaftesbury and made Lord Chancellor. Beginning to oppose the government, he was dismissed by the king in 1673. His opposition now became violent; he protested against the prorogation of Parliament, and in 1677 was committed to the Tower for more than a year. He again became powerful through Oates's "popish plot," drew up the test bill of 1678, became nominal chief of the government as president of the new permanent council, and framed the *habeas corpus* act of 1679. Parliament was dissolved, and Shaftesbury dismissed. In the Parliament of 1679 he carried resolutions against the Duke of York, and caused the Exclusion Bill to be again brought forward and led the persecution of the Catholics. The king again dissolved Parliament, and the next one met at Oxford; but Shaftesbury being still all-powerful in the Commons, it was soon dissolved (1681). The earl was arrested on the charge of high treason, but was liberated, and retired to Amsterdam, where he died. He was the Achitophel of Dryden's satire, is brilliantly sketched by Macaulay, and gave name to Ashley and Cooper rivers in S. Carolina.

Shag. See CORMORANT.

Shagreen', a hard, strong leather made in Persia and the East. The name is also given fish skins, principally those of sharks and rays, covered with calcified papillæ. Shagreen prepared from the tuberculous skin of the ray (*Trygon sephen*) is called *galuchat* by the French. Shagreen is dyed in various colors, and is used as a covering for small articles.

Shah, title of the ruler of Persia and other Asiatic princes. The sons and male relatives

of the Persian shah assume this title, the full title of the monarch being *shah-in-shah*, king of kings.

Shah Abbas'. See ABBAS I.

Shahap'tians, a family of N. American Indians, comprising the following tribes: Chopunnish, Sahaptin, Nez Percé or Nimapu (the last being their own name), Klikatat, Paloos, Tenaino, Tushepaw, Tyigh, Umatilla, Walla Walla, Yakima. These occupied a large section of country along the Columbia River and its tributaries, their W. boundary being the Cascade Mountains. Living on the large water courses, salmon constituted their most important food, but the possession of horses (for all the tribes were "horse Indians") wrought great change in their habits, and caused them to become hunters. At the time of Lewis and Clark's visit (1804–5) none of these tribes had any idea of agriculture, and some of the bands on Snake River periodically suffered from hunger. The Chopunnish were then living, like the Chinook, in communal houses, and the same custom probably prevailed also in the other divisions of the family.

Shahjahan'pur, city of Rohilkand, British India; on the Garrah; founded in 1647, and contains fine mosques and the ruins of a castle. It exports cereals and sugar. Pop. (1901) 76,458. It is the chief place of a district of the same name. Shahjahanpur is the name of several other towns in N. India.

Shahjehanabad'. See DELHI (city).

Sha'kers, a religious body so called from their use of dancing in their worship, but their own title is The Millennial Church, or United Society of Believers in Christ's Second Coming. They originated in England in the eighteenth century, with James Wardlaw, a quaker, and his wife Jane, who announced the second coming of Christ in the form of a woman. One of their converts, Ann Lee (1736–84), wife of a blacksmith, Abraham Stanley, while imprisoned in 1770 received a revelation inculcating celibacy, and directing her to found a settlement in America. She settled in Watervliet, N. Y., 1776, and there died. In 1837 many of the Shakers claimed to have received, in visions, messages from Mother Ann Lee and others. Shakers believe that Christ made His second appearing in Ann Lee and her followers; that God is one in essence, but dual in His manifestation, the redeemed and perfected man and woman. They own no wives, nor husbands, nor private property, nor have carnal relations; they each toil for the good of the whole. The government is parental. The leading authority is vested in four persons, two of each sex, called ministry.

Shakes'peare, William, 1564–1616; English dramatic poet; b. Stratford-on-Avon. His father, John Shakespeare, was a yeoman; his mother, Mary Arden, was of the minor gentry. John Shakespeare became a landholder, and rose to be chief alderman and ex-officio justice of the peace. Misfortune, however, befell him, and he was reduced to poverty. Of Shakespeare's boyhood nothing is known. His familiarity with law terms has been regarded as indicating that he was in an attorney's office. In his eighteenth year he had become entangled with a woman of twenty-five, Anne Hathaway, daughter of Richard Hathaway, of Shottery, near Stratford. He married her by special license, November 28, 1582, and their first child, Susanna, was baptized, May 26, 1583. Twins, a boy and girl, named Hamnet and Judith, were baptized, February 2, 1585. Shakespeare about this time left Stratford to seek his fortune in London. Tradition says that he had killed some of the deer of Sir Thomas Lucy, of Charlecote, and that the knight's vindictiveness was one of the causes of his leaving.

Nothing is known of Shakespeare's first years in London. He got some position inside the theater, and became an actor. He performed in Jonson's "Every Man in his Humour" and "Sejanus"; as the *Ghost* in "Hamlet," and as *Adam* in "As You Like It." He began as a dramatist by rewriting old plays in conjunction with others, his seniors in years and as playwrights. Marlowe, Greene, and Peele were perhaps among Shakespeare's collaborators. His superiority soon asserted itself, and he began to write alone. His first original play was probably "Love's Labour 's Lost." He probably also had some share in the revision of Part I of "Henry VI." Shakespeare's success excited the enmity of at least one of those whom he eclipsed—Robert Greene, a gifted but dissolute man, who died in wretchedness, and who sneered at Shakespeare as "an upstart crow, beautified with our feathers; . . . and that being an absolute *Johannes factotum*, is in his own conceit the only Shake-scene in a country." "Beautified with our feathers" may mean that he got credit by acting what others wrote; but some take it to be a charge of plagiarism. Later, Henry Chettle came to the defense of Shakespeare in a pamphlet in which he says that his demeanor was "no less civil than he was excellent in the quality he professes"; adding that "divers of worship [people of rank and reputation] have reported his uprightness of dealing, which argues his honesty, and his facetious [felicitous] grace in writing which approves his art."

Among the friends that Shakespeare won was the Earl of Southampton, who took great interest in literature and the drama. To him the poet dedicated "Venus and Adonis," his first literary effort; he calls it "the first heir of his invention." There is a tradition that Southampton gave Shakespeare £1,000, quite equal to £6,000 at present. When Shakespeare published "Lucrece," he dedicated this also to Southampton, saying, "The love I dedicate to your lordship is without end. . . . What I have is yours; what I have to do is yours; being in part all I have devoted yours." It was possibly through the nobleman's generosity that the poet became a sharer in the Blackfriars Theater. Contemporary evidence shows that he was the most admired of the dramatists, and that when the productions of the best of his contemporaries—Ben Jonson included—failed to pay expenses, his plays filled the house to overflowing. He entered upon a career of dramatic production which is without a paral-

lel in the history of literature, and which soon placed him in independent circumstances. He had money to spend and money to lend; and he used it to place his father in comfort. He invested money in the tithes of Stratford, and he bought New Place, the best house in the town, and gradually added other lands to the estate. To this house he retired abt. 1611, and there he died, and was buried in the Stratford church.

Of Shakespeare's life in London little is known. Fuller says that he and Ben Jonson used to have many "wit combats," in which he compares Jonson to a heavy Spanish galleon and Shakespeare to a light English man-of-war. Jonson supports Fuller's comparison by saying that Shakespeare was distinguished by great copiousness and facility of thought and language—so great as to be almost oppressive to his hearers. There was a sort of club of which Raleigh, Jonson, Beaumont, Selden, and Donne were members, and which met at the Mermaid Tavern; and the wit combats probably took place at these meetings. Shakespeare's "Sonnets" were published in 1609, and were dedicated to a "Mr. W. H." as their "only begetter," but by the publisher, not by the poet. Many commentators believe that the sonnets are autobiographical. Most, if not all, of the first 126 are apparently addressed to one person—a man, not a woman—and the rest (except the last two) to the "dark lady" with whom this man and Shakespeare were both entangled. Others believe that the poems are mere "exercises of fancy," with no foundation in the personal experience of the author. The autobiographical theory has received confirmation from researches which prove that "Mr. W. H." was William Herbert, afterwards Earl of Pembroke; and that the "dark lady" was probably Mary Fitton, maid of honor to Elizabeth, and a mistress of Herbert's, by whom she had a child.

After the birth of his children Shakespeare lived for more than twenty years in London, visiting Stratford, tradition says, only once a year. His will has no mention of his wife except in an interlined bequest of the "second-best bed," apparently inserted during his last sickness. But as soon as he was prosperous in London he bought a house in Stratford, and gradually made it an elegant home. As to the will, his wife was provided for by her rights of dower, and the bequest of the bed may have been a token of affection, not the insult it would else have been.

Shakespeare's dramas assumed the forms of comedy and tragedy, and of history or historical play, and conformed in every external respect to the fashion of his time and the needs of the theater. His difference from other dramatists consists in his thought and his language, and in his power of dramatic characterization. No other writer ever united imagination, fancy, humor, knowledge of human nature, worldly wisdom, psychological insight, and creative power, as all these were united in him. The fertility of his mind appears to have been inexhaustible, the profundity of his thought illimitable. He throws away upon a minor personage and an unimportant situation poetical thoughts and philosophical reflections which other writers would have carefully reserved for elaboration upon great occasions. His dramatic isolation from his creations appears to have been perfect; once evoked from his mind, they exist independently and altogether outside of it, and act and speak altogether according to the laws of their own being. He shows us that both good and bad often act from mixed motives. It is in this inflexible justice that one of the chief evidences of his superiority is found.

His plays were written not to be read, but to be performed; and it was to the interest of all concerned that they should not get into print. But the publishers sought copies for publication, and obtained them surreptitiously; sometimes by corrupting persons connected with the theater, and sometimes, as the text which they printed shows, by sending shorthand writers to the performance. Twenty of Shakespeare's plays were thus published during his lifetime. They are known as "the quartos" from the form in which they are printed. Most of them are full of errors, but they are of great value in the formation of the text. For the remaining seventeen plays we are dependent upon the folio edition of the whole thirty-six (not including "Pericles"), published in 1623, under the authority and editorial supervision of two of Shakespeare's fellow actors, John Heminge and Henry Condell. This "first folio," although superior to the quarto copies, is yet marred by many errors and omissions.

The order in which the poems and plays were written is disputed, but in recent years certain facts have been well established. If Shakespeare wrote "Titus Andronicus," it was probably his first play, and produced before 1590; or whatever he did in revising that play and "1 Henry VI" for the stage was probably done between 1588 and 1591. "Love's Labour 's Lost," it is agreed, was his first original play (1590), followed by the "Comedy of Errors," the "Two Gentlemen of Verona," and "A Midsummer Night's Dream" (1591–94), to which period must also be assigned "2 and 3 Henry VI" and "Richard III." The first draft of "Romeo and Juliet" may have been as early as 1591. Then followed "Richard II" (1594), "King John" (1594–95), "The Merchant of Venice" (1596–97), "1 and 2 Henry IV" (1597–98), and "Henry V" (1599). "As You Like It," "Much Ado," and "Twelfth Night" must have been written in 1599–1600, and "Julius Cæsar" by 1601. The "Merry Wives of Windsor" is to be grouped with the other Falstaff plays, and "The Taming of the Shrew" (not wholly Shakespeare's) must be put between 1594 and 1598. The first form of "Hamlet" is dated between 1600 and 1602. The dates of the rest of the plays are probably as follows: "All's Well" (1602), "Measure for Measure" (1603), "Troilus and Cressida" (1603?), "Othello" (1604), "Lear" (1605), "Macbeth" (1606), "Antony and Cleopatra" (1607), "Coriolanus" (1608), "Cymbeline" (1609), "The Tempest" (1610); "Winter's Tale" (1610–11). "Timon of Athens" (1607–8?), "Pericles" (1608?), and "Henry

VIII (1612–13?) are Shakespeare's only in part. "Venus and Adonis" was probably written before 1592; "Lucrece," 1593–94; and the "Sonnets," 1595–99, though some may have been later.

There are few traces, even in tradition, of any intercourse between Shakespeare and the eminent men of his time except Ben Jonson, Drayton, and the Earls of Pembroke and Southampton. Shakespeare and Bacon lived at the same time in the same city, then not a large one, passed each other in the street, and yet probably never interchanged one word. The reason was that one was a player and a poet, the other a statesman and a philosopher, and that each was absorbed in his own affairs. The notion that Shakespeare's plays were written by or in conjunction with Bacon—which has found a few ingenious advocates—is unworthy a moment's consideration by any reasonable creature.

There is a stone over Shakespeare's grave on which there is this inscription:

> Good frend for Iesus sake forbeare
> To digg the dust encloased heare.
> Blest be ye man yt spares thes stones,
> And curst be he yt moves my bones.

These lines, which may embody a wish expressed by Shakespeare, but which are hardly of his writing, have prevented the removal of the remains of the greatest Englishman to Westminster Abbey. According to the bust which forms part of his monument, he was at fifty-three portly but not at all corpulent, with a high forehead, a head somewhat bald, a small aquiline nose, and a well-formed mouth and chin. Aubrey, who lived two generations after him, had heard that he was a "handsome, well-shapt man." The bust and the engraved portrait in the folio are the only portraits of Shakespeare of indubitable authenticity; but one known as the Chandos portrait has tradition in its favor.

Shakespeare had no followers or imitators; he established no school. Dramatic taste and dramatic writing declined after the Elizabethan age (1575–1625), and by the beginning of the eighteenth century Shakespeare was lightly thought of by the critics, and neglected by the actors. From the time of Rowe's edition in 1709, the fame of Shakespeare grew until, about the beginning of the nineteenth century, he was acknowledged to be the greatest master of imagination and of language that the world has known.

Shakespeare left little trace of his personality. His only son, Hamnet, died at the age of twelve. His two married daughters left children, but the family became extinct in the third generation. New Place was in 1759 razed by its last owner, the Rev. Francis Gastrell, who was exasperated by a quarrel with the town authorities and by the persecution of prying visitors to the home of the poet.

Shale, a laminated rock resulting from the induration of mud or clay stratified in water. The shales are the most abundant of all stratified rocks. From the sediments washed down from the land and deposited in the ocean, the larger grains are usually separately deposited, giving rise to sandstones; the soluble matter, chiefly calcium carbonate, is also in the main separately deposited as limestone; and the residuum is deposited as mud, and eventually converted into shale. When subjected to great pressure shale is converted into slate and crystalline schist. Shales are used for flagstones, for making paving bricks and hydraulic cement.

Sha'ler, Nathaniel Southgate, 1841–1906; American geologist; Prof., Harvard, after 1868, at first of Paleontology, then of Geology; dean of the Lawrence School after 1891; director Geological Survey of Kentucky, 1873–80; geologist of the U. S. Geological Survey, 1884; president Geological Society of America, 1895. He was a prolific author and entered many fields.

Sha'manism, the religion of a large number of primitive N. Asiatic tribes, blended in central Asia with Lamaism (*q.v.*). It has no idols, save some rude ancestral images. The Shaman performs incantations and sacrifices, mainly to procure oracles and to purify houses of the defilement of the dead body. Although the Supreme Being is good, yet so powerful is the king of the lower world that worship is conducted to placate him. Hence the declaration that Shamanism is devil worship.

Sha'mo, Des'ert of. See GOBI.

Shamo'kin, borough, Northumberland Co., Pa., in the anthracite region, has ironworks and other manufactures. Pop. (1910) 19,588.

Sham'rock, the national badge of Ireland. It is a plant with trifoliate leaves, which was used by St. Patrick to illustrate the doctrine of the Trinity. The plant now called by the name is a hop clover (*Trifolium minus*). The wood sorrel (*Oxalis acetosella*), the white clover, and the black medick or nonesuch (*Medicago lupulina*) have each been identified with the original shamrock.

Shamyl (shăm'îl). See SCHAMYL.

Shanghai (shăng-hā'ĭ), city of province of Kiangsu, China, on the Hwang-pu River. The native part is composed of narrow, dirty streets, but the foreign settlements are so well laid out and kept as to be termed the "model settlement of the East." Goods are transshipped to the interior by canals. Over $200,000,000 of imports are received annually, principally from Great Britain and her colonies. The exports include beans, chinaware, raw cotton, hemp, rice, tea, and wheat. Over 3,000 vessels enter the port annually. Pop. (1907) 651,000, of whom about 7,000 are foreigners.

Shan'non, the largest river of Ireland. It rises in county Cavan, and enters the Atlantic through an estuary 10 m. wide. In its course of 254 m. it forms several lakes, *viz.*: Loughs Allen, Boderg, Bofin, Forbes, Ree, and Derg. The Inny, Brosna, Mulkear, Maigue, and Deel fall into the Shannon on the left, and the Suck and the Fergus on the right.

Shans, Burmese name for the most numerous of the races of Indo-China. They form the chief race of the Siamese. They probably migrated from the mountains of Sze-chuen, and

appeared on the upper waters of the Irawadi about two thousand years ago. Their languages, appearance, and customs are very similar, though they are much divided geographically and politically.

Shansi (shän-sē'), province of China; area, 56,268 sq. m.; surface mountainous and minerals abundant. Pop. (1906) est. at 12,200,456; capital, Tai-yuen.

Shan States, semi-independent states in the N. part of the Indo-Chinese peninsula, between Burma and Tonquin. Those adjoining Tonquin are under French protection, and a disputed central area, by agreement between France and Great Britain, is an independent "buffer" state between China, Siam, Burma, and Tonquin. Area, 68,165 sq. m.; pop. (1901) 1,237,749.

Shantung (shän-tông'), province of China; area, 65,104 sq. m.; pop. (1906) est. at 38,000,000. The surface is diversified, but consists in the main of a fertile plain. The highest peak, Mount Ṭai (4,100 ft.)—according to Chinese reckoning, 15 m. high—is one of the five sacred mountains of China, and much resorted to by pilgrims. The coast is deeply indented with good harbors. The best are Wei-hai-wei and Chefoo. The finest brocaded silk is made near Tsinan-foo, the capital.

Attention has already been called to the rival claims of China and Japan before the Peace Conference for the possession of Kiao-Chau (*q. v.*) and other parts of the Shantung province. Under the peace treaty Germany ceded to Japan all rights, titles, and privileges, notably as to Kiao-Chau, and the railroads, mines and cables acquired by her treaty with China, March 6, 1897, and other agreements as to Shantung. All German rights to the railroad from Tsing-tao to Tsinan-fu, including all facilities, mining and exportation rights, the cables from Tsing-tao to Shanghai and Che-foo, and all German state property in Kiao-Chau, were acquired by Japan.

Shark, large group of fishes allied to the rays and skates, but with the gill openings at the sides of the body. The body is elongated and cylindrical, and passes gradually into the tail. Of the species that attack man the most formidable is the great white shark, or man eater, sometimes 40 ft. long. It follows ships for the refuse thrown overboard. The great blue shark reaches the coast of both Europe and the U. S., and the tiger shark, common in the Indo-Pacific, also reaches the Atlantic coast of the U. S. The sharp-nosed shark is common on the S. Atlantic coast of the U. S. The voracious gray shark or sand shark, common on the N. Atlantic coast of the U. S., is a wide-ranging species, about 6 ft. long. The Greenland shark, nurse shark, or sleeper, about 15 ft. long, is noted among whalers for its voracity.

The basking shark, about 40 ft. long, inhabits the open sea, and is named from its habit of floating on the surface in calm weather. Its liver yields from a ton to a ton and a half of oil. The whale shark exceeds 50 ft. The hammerhead shark is 15 to 20 ft. The tiger shark of the Indian Ocean attains 15 ft., of which the bladelike tail makes one half. The spinous shark has its body studded with bony tubercles, each of which bears a thornlike elevation. The existing cow sharks are represented by teeth in the Jurassic. The smaller littoral forms are known as dogfishes and hounds.

Sharp, musical term denoting a note raised a semitone in pitch, as, for example, C *sharp* (C ♯), which is a half step or semitone higher than C.

Sharp, William (pen name, FIONA MACLEOD), 1856–1905; English author; b. Paisley; educated at Univ. of Glasgow; made a voyage to Australia; settled in London abt. 1879. He wrote the lives of D. G. Rossetti and Browning; also many critical essays and some verse. He edited the "Canterbury Poet Séries," and published several novels. His works include "The Human Inheritance," "Transcripts from Nature," "Earth's Voices," "Romantic Ballads," and "Greek Studies."

Sharpsburg, village, Washington Co., Md., between the Antietam and Potomac rivers. It was the scene of the battle of Antietam, September 17, 1862. Pop. (1910) 960.

Shasta, Mount, a mountain in the State of Washington which topographically forms the N. termination of the Sierra Nevada Range. Height, 14,350 ft.

Shastra, an authoritative book of the Hindus upon religion and civil and religious law. Such works are collectively called *Dharmaśāstra,* or "Law Shastra."

Shaw, George Bernard, 1856– ; Irish essayist and dramatist; b. Dublin; early became prominent as an exponent of socialism and a disciple of Ibsen. His writings are forceful and daring, and have been the field for much popular discussion and wide criticism. Among the best known of his works are the dramas, "Candida," "Man and Superman," "Major Barbara," "Captain Brassbound's Conversion," "You Never Can Tell," "The Admirable Crichton," and the essays, "Quintessence of Ibsenism," "Fabian Essays," and other tracts on socialism published by the Fabian Society.

Shaw, Henry Wheeler, 1818–85; American humorist; b. Lanesborough, Mass.; began to write humorous sketches signed "Josh Billings," 1863; became popular as a writer and as a lecturer; edited an annual "Allminax."

Shaw, Lemuel, 1781–1861; American jurist; b. Barnstable, Mass.; was Chief Justice of the Massachusetts Supreme Court, 1830–60. The city charter of Boston was drafted by him in 1822.

Shawl, loose garment worn on the shoulders or around the waist, made by the different nations of different materials, as the Kashmir shawl of goat's hair, the Chinese of silk, the barège of wool, etc., and in different patterns, as the palm pattern of India, the plaid pattern of Scotland, etc. The most celebrated is the Kashmir shawl, made from the under wool of Kashmir goats, famous as early as the sixteenth century. Its manufacture was then under the supervision of the government, and

each shawl received a separate description in the royal registers. In Europe shawls are mostly of wool, cotton, or of mixed cotton and silk.

Shays, Daniel, 1747–1825; American colonial insurgent; b. Hopkinton, Mass.; was a captain in the Revolutionary War; took part in a movement in W. Massachusetts against the state government, 1786, and became so prominent that it is known as "Shays' Rebellion." Its pretexts were the high salary paid the governor, the aristocratic character of the Senate, the extortions of lawyers, and the pressure of taxation. In December, 1786, he led a force of insurgents to Springfield to capture the arsenal, but was repulsed. His forces were dispersed by Gen. Lincoln, and Shays fled to New Hampshire; was pardoned by the Massachusetts Legislature, and removed to Sparta, N. Y., where he received a pension for his revolutionary services. See SHEARWATER; SKIMMER.

Sheath'ing, covering for a ship's bottom, made of sheet copper or other metal, and first introduced abt. 1800. It not only serves to protect wooden ships from boring shrimps, teredos, and other small destructive animals, but to a great extent it prevents the fouling of the bottom by seaweeds and barnacles.

She'ba, or **Sa'ba,** name of three persons in the Old Testament, and of the kingdom of the Sabeans in S. Arabia, whose queen (Balkis) visited Solomon.

Sheboy'gan, capital Sheboygan Co., Wis.; on Lake Michigan; has numerous factories, with an annual product of over $11,000,000; has large furniture factories. Its mineral water is celebrated. Pop. (1910) 26,398.

Sheep, animals of the genus *Ovis*. They are hollow-horned ruminants, and belong to the artiodactyl, or pair-toed; ungulate, or hoofed, mammals. Both sexes of the wild breeds have horns, but in many of the domestic breeds they

MERINO SHEEP.

are absent. The tail is usually short, although the broad-tailed sheep of Asia have tails so large that they have to be assisted to carry them. Sheep are distinguished by a covering of wool, which varies under climatic and other conditions.

Geographically, the wild breeds are, or were, distributed over the islands of the Mediterranean, in Europe, the temperate highlands of Asia, the Rocky Mountains, and the Andes. There are more than twenty species. Of these, *O. montana* is the bighorn or Rocky Mountain sheep. The origin of many breeds cannot be traced. The originals may have sprung from the musimon of Corsica or the argali of Asia. In N. America sheep are reared for their meat and wool, but in some countries they are also kept for their milk. The recognized breeds in

LEICESTER SHEEP.

N. America are all of European origin. They are: Fine-wooled breeds—Merino, and subvarieties. Medium-wooled breeds—Southdown, Dorset Horn, Suffolk, Shropshire, Hampshire Down, Oxford Down, Cheviot. Coarse-wooled breeds—Leicester, Lincoln, Cotswold, Black-faced Highland. The above classification is based on the character of the wool, which, in going down the list, increases in coarseness.

Wild sheep never frequent swamps, exposed plains, or dense forests from choice. The smaller the breed the higher and more rugged may the pastures be, and the larger the breed the richer and more level should they be. Except at the lambing season, they only require to be protected from storms, as they are not easily injured by low temperatures. In circumscribed pastures the flocks should be small, but with the smaller breeds, and ample foraging grounds, they may run into the thousands. Sheep were first introduced into the U. S. in 1609. Value of sheep in U. S. (1911) was $181,170,000. See BOVIDÆ.

Sheeps'head, a fish (*Archosargus probatocephalus*) of the family *Sparidæ*, found along

SHEEPSHEAD.

the Atlantic coast of the U. S., S. of Cape Cod. The name is given in allusion to a fan-

cied resemblance of the head to that of a sheep, produced by the form and color as well as the cutting teeth of the jaws. It is sometimes over 2 ft. long. It is esteemed on account of the delicacy of its flesh and as a game fish. It feeds on molluscs and crustaceans, and its molar teeth and stout jaws are adapted for breaking shells. The fresh-water drum is among the fishes loosely called sheepshead in the U. S.

Sheep Tick, Louse, or Ked, a wingless parasitic insect, ¼ in. long (*Melophagus ovinus*), of the order *Diptera* and family *Hippoboscidæ*, often extremely annoying to sheep. It lives in their wool, and punctures the skin to suck blood. There are various arsenical washes which will destroy them; a solution of carbolic acid is also recommended.

Sheerness', a fortified seaport in Kent, England; on the Medway, 52 m. E. of London. The government dockyard covers sixty acres. Pop. (1901) 18,179.

Shef'field, town in Yorkshire, England; at the junction of the Sheaf and the Don; 41 m. E. of Manchester. The cutlery business of Sheffield dates from very early times. Sheffield Castle, rebuilt in 1270, was the place of imprisonment of Mary, Queen of Scots (1572–86). It was taken by the parliamentary army in 1644, and demolished. Sheffield is the center in England of the manufacture of all kinds of agricultural, mechanical, medical, and optical instruments. Pop. (1911) 454,653.

Sheik (shēk), Arab elder, venerable old man, chief, a title among the Arabs applied to the head of a tribe. Among Mussulmans in general it is prefixed to the name of a religious dignitary, or one versed in theology, or a reputed saint. By extension it is a common courtesy title.

Sheikh-ul-Is'lam. See MUFTI.

Shek'el, a weight among the ancient Israelites, and also a coin of gold, silver, or copper, originally of a shekel's weight. The shekel of the sanctuary (Ex. xxx, 13; Num. iii, 47) was made of silver, and was equal to 20 gerahs (Ezek. xlv, 12), or about 54 cents. There were other kinds of shekels. The gold shekel was worth about $5.69; the copper shekel, a little more than 3 cents.

Shel'burne, William Petty Fitz-Maurice (Earl of), afterwards Marquis of Lansdowne, 1737–1805; b. Dublin. Became president of the Board of Trade and Privy Councilor in the Grenville ministry, 1763; opposed the policy which led to the enactment of the Stamp Act and other measures oppressive to America; became a personal friend of Franklin; was dismissed from office, 1763, and attached himself to Pitt. He became Secretary of State in Pitt's administration, 1766; resigned, 1768; became Secretary of State in the Foreign Department, 1782, and Premier on the death of Rockingham; negotiated the preliminaries of peace with the U. S.; resigned, 1783.

Shel'by, Isaac, 1750–1826; first Governor of Kentucky; b. near Hagerstown, Md.; became a surveyor in W. Virginia; served as lieutenant at battle of Point Pleasant, 1774; rendered distinguished service at King's Mountain, October 7, 1780; served under Marion, 1781, and under Greene, 1781–82, and sat in the N. Carolina Legislature. He settled in Lincoln Co., Ky. (then Virginia), 1788; was Governor of Kentucky, 1792–96 and 1812–16; took part in the victory of the Thames; was commissioner with Gen. Jackson in negotiating a treaty with the Chickasaws, 1818.

Shel'drake, or **Shieldrake,** a river duck. The common sheldrake (*Tadorna tadorna* or *cornuta*) is about the size of a goose, and has a red bill, head and neck green, with a white collar below, and a brown belt extending across the upper portion of the back. The shoulders

COMMON SHELDRAKE.

and a median abdominal stripe are black, the speculum is green, and the rest of the plumage is white. It is found on sandy seacoasts in the Old World, making nests lined with down in abandoned rabbit burrows. The ruddy sheldrake or Brahminy duck (*Casarca rutila*) is found mostly in SE. Europe and in Asia. The so-called sheldrakes of N. America are mergansers.

Shel'lac, or **Shell-lac.** See LAC.

Shel'ley, Mary Wollstonecraft (GODWIN), 1797–1851; English author; daughter of William Godwin and Mary Wollstonecraft; b. London; educated in accordance with the peculiar social theories of her parents; married Shelley, December 30, 1816, after having lived with him two years previously to the death of his first wife. She was the author of "Frankenstein" (1818), a novel displaying great power (the hero of which creates a monster in human form); of "Valperga," "Lodore," and other less successful romances; contributed to "The Cabinet Cyclopædia" biographies of literary and scientific men of France, Italy, and Spain, and edited the works of her husband.

Shelley, Percy Bysshe, 1792–1822; English poet; b. near Horsham; England; the son of Sir Timothy Shelley, a country gentleman of Sussex. While at Eton he wrote with his cousin, Miss Grove, with whom he was in love, a romance, "Zastrozzi" (1810). He also wrote "St. Irvyne, or the Rosicrucian" (1811), translated part of Pliny's "Natural History," and composed with Capt. Medwin the poem, "Aha-

suerus, or the Wandering Jew." In 1810 he went to Oxford, from which he was expelled for publishing a pamphlet on the "Necessity of Atheism." His father refused to receive him, and all communication was forbidden between him and Miss Grove, who soon married another. He took lodgings in London, and in 1811 married Harriet Westbrook, daughter of a retired hotel keeper.

In 1812 he published in Dublin a pamphlet entitled "An Address to the Irish People," throwing copies from his window. Quitting Dublin at the suggestion of the police, he resided in various places, and in 1813 settled in London. There his daughter Ianthe Eliza was born, and he and his wife separated by mutual consent, she returning to her father's house, where a second child was born (d. 1826). He was soon traveling abroad with Mary, daughter of William Godwin and Mary Wollstonecraft, all of whom deemed marriage a useless institution. His father settled on him from this time £1,000 a year. In 1816 his wife drowned herself, and he married his second wife, who had been his companion for two years, and settled near Marlow. He had completed "Queen Mab" in 1812. In 1815 he wrote "Alastor." At Marlow he wrote "The Revolt of Islam," a grandly conceived and highly original poem, but with many inequalities. The Court of Chancery refused him the custody of his children by his former wife on the ground that he was an atheist. In 1818 he went to Italy, as he suffered from pulmonary disease. At Lucca he completed "Julian and Maddalo," a dialogue between himself and Lord Byron, a masterpiece, and began "Prometheus Unbound." His next production was his tragedy, "The Cenci," the most elaborate in execution of all his writings. In 1819 he wrote "The Witch of Atlas," and in 1821 produced his "Epipsychidion," "Adonais," a monody on the death of Keats; and "Hellas," a drama inspired by the insurrection in Greece. He was drowned while sailing from Leghorn to Lerici, and his body was burned on a funeral pile in accordance with the quarantine laws of Tuscany, in the presence of Lord Byron, Leigh Hunt, and Mr. Trelawney.

Shell Heaps, artificial deposits constituting a leading feature of the aboriginal remains of N. America, and occurring in all habitable countries. These heaps are the kitchen middens of mollusc-eating peoples. Oysters, clams, mussels, and numerous varieties of univalves yield a very large percentage of compact and durable refuse. In some cases the heaps were modified for domiciliary and defensive purposes, and when the sites became places of sepulture the shells were utilized for mounds. Some of these heaps cover ten, twenty, or even forty acres. In Maryland alone the oyster banks cover upward of 100,000 acres. A depth of 40 ft. is reported, and deposits in Brazil are said to be 100 ft. deep. The shells on decomposing yield a dark rich marl, and where decay is advanced the fields covered are very fertile. In many places the shells are calcined, and employed as a fertilizer. At Pope's Creek, Md., a single midden has yielded upward of 200,000 cu. ft. of oyster shells for this purpose.

Shells, in artillery. See PROJECTILES.

Shells, in natural history. See MOLLUSCA.

Shel'ly's Case, a case at law, decided in 1591, found in Lord Coke's "Reports." It is a landmark of the English law of property, and established a technical rule known as the Rule in Shelly's Case, which he stated as follows: When a person takes an estate for life, under a deed or will, and in the same instrument there is a limitation by way of remainder to his heirs or to the heirs of his body as a class of persons, the limitation to the heirs merely operates to enlarge the estate of the person to whom the life estate is given; if the remainder be to the heirs of his body, he takes an estate in fee tail; if to his heirs generally, an estate in fee simple. The rule had no application, however, to the limitation of a remainder to any particular person, who might, nevertheless, be the heir of the life tenant. Thus a limitation of a life estate to A, with remainder to his eldest son and the heirs of the latter, was not within the rule. The rule itself has been abrogated by statute in New York and many other states, where a limitation of the kind affected by it would now take effect according to the terms of the conveyance.

Shemit'ic Lan'guages, same as SEMITIC LANGUAGES (*q.v.*).

Shenando'ah, borough, Schuylkill Co., Pa.; 105 m. NW. of Philadelphia. It is in the heart of the anthracite region, the development of which has given it rapid growth. Shenandoah was laid out in 1862, and incorporated in 1866. Pop. (1910) 25,774.

Shenandoah Riv'er, stream which rises in Augusta Co., Va., and flows NE. 170 m. to the Potomac. The N. fork joins the main stream at Front Royal. The Shenandoah affords great water power. During the Civil War its valley was the scene of many military operations, and was laid waste by Sheridan in 1864.

Sheng-King', sometimes called FENG-TIEN, the most S. province of Manchuria, borders on Mongolia, Korea, Korea Bay, the Gulf of Liautung, China proper, and Kirin; area, 56,000 sq. m.; pop., 10,312,241; capital, Mukden. The chief ports are New-chwang, Taku-shan, and Pi-tse-wo.

Shen'si, province of China; area, 75,270 English sq. m. The loess formation gives everything a yellow tint. Wheat is the staple product. Capital, Hsi-an. Pop. (1906) est. at 8,450,182.

Shen'stone, William, 1714–63; English poet; b. near Halesowen, Shropshire; studied at Oxford, and passed his life in retirement writing poetry which had considerable popularity. "The Schoolmistress," the "Pastoral Ballad," and the stanzas "Written in an Inn at Henley" are the only ones remembered.

She'ol, the transliterated Hebrew word, meaning a hollow place, a cave, used in the Revised Version of the Bible to denote the place of departed spirits. It therefore corresponds with the Greek Hades. In the Au-

thorized Version it is translated by pit, grave, hell.

Shep'herd Dog, breed of domestic dogs trained to assist in attending the flocks of sheep. Of all strains of shepherd dogs the Scotch collie is the most celebrated.

Shepherd Kings, certain rulers of Egypt, known also as HYKSOS (*q.v.*).

Shere Ali (shēr ä'lē), 1825–79; Ameer of Afghanistan; succeeded his father in 1863, and seemed to be open to British influence, but was compelled by a revolt of the conservative party to change his policy and submit to Russian influence. As he declined to receive a British embassy, though a Russian embassy lived in Cabul, the British invaded the country in 1878. Shere Ali fled across the frontier, and died suddenly.

Sher'idan, Philip Henry, 1831–1888; American military officer; b. Albany, N. Y.; graduated at West Point, 1853; captain Thirteenth Infantry, 1861; colonel Second Michigan Cavalry, and then brigadier general of volunteers. Led the advance into Kentucky, and was in the campaign of Tennessee. Took part in battle of Murfreesboro, and was made major general of volunteers. He took part in the battle of Chickamauga, September 19th, 20th, and in the operations about Chattanooga, and was then engaged in E. Tennessee till March, 1864. From April 4th to August 3d he was in command of the cavalry corps of the Army of the Potomac, and was employed in the Wilderness, and between it and Richmond. On August 4th he was in command of the Army of the Shenandoah, and on the 7th to that of the middle military division. He defeated Early on the Opequan, September 19th, for which he was made a brigadier general in the U. S. army; at Fisher's Hill, September 22d; and at Cedar Creek, October 19th, where he turned a rout into a victory. On November 8th he was made a major general. From February 27th to March 24th, 1865, he was engaged in a raid from Winchester to Petersburg, and from March 25th to April 9th in the Richmond campaign. On April 1st he gained the battle of Five Forks, and led in the pursuit of Lee, and was present at his capitulation, April 9th. He afterwards commanded in several departments, and on March 4th, 1869, was made lieutenant general and assigned to the division of the Missouri. He assumed command of the army, 1883; was appointed general, 1888.

Sheridan, Richard Brinsley Butler, 1751–1816; British dramatist; b. Dublin; educated in Dublin and at Harrow School; published a rhymed translation of Aristænetus, August, 1771; brought out his first comedy, "The Rivals," 1775; followed it with an opera, "The Duenna," and which was acted seventy-five nights; became part owner of Drury Lane Theater; produced "A Trip to Scarborough," 1777, and "The School for Scandal," the most successful comedy of manners in English; wrote "Monody on Death of Garrick," 1779; brought out the farce of "The Critic," 1779. He was elected to Parliament, 1780; was Secretary of the Treasury, 1782; crowned his fame as an orator by two speeches against Warren Hastings; produced in 1799 his play, "Pizarro." The burning of Drury Lane Theater, 1809, left him in poverty. Through dissipation and carelessness in money matters, his last years were harassed by creditors.

Sherif (shĕr'ĭf), a title applied by Mohammedans to descendants of Fatima, daughter of the prophet. The Sherif of Mecca is the guardian of the Kaaba, and chief dignitary of the city.

Sher'iff, a county officer with administrative and generally also judicial functions.

In England, Ireland, and Wales the sheriff is the chief officer of the crown, in every county or shire, who does all the sovereign's business in the county, the custody of the county being committed to him alone by letters patent of the crown. The office of sheriff is one of the most ancient and honorable known to the English law. Sheriffs were formerly chosen by the inhabitants of the several counties, but now they are annually appointed by the crown. The discharge of the office is compulsory. The sheriff was formerly a judicial officer before whom might be held the trial of certain disputed facts, but now he is mostly relieved of this burden. As the keeper of the king's peace he is the first man in the county, and superior in rank to any nobleman therein during his term of office. He may apprehend and commit anyone who attempts to break the peace; and may bind anyone in a recognizance to keep the peace. He is bound to pursue all traitors, murderers, and other lawbreakers, and commit them to jail. He is also to defend his county against any of the king's enemies, and may command all the people of the county to attend him.

The sheriff, as an officer of court, is also bound to execute processes issuing from the high court of justice, and to attend on the judges when they come into the county. In executing criminal process the sheriff may break open the outer door of any dwelling house or other building, but in executing civil process he cannot force an entrance into a dwelling house, although when once admitted he may break an interior door; and he may break the outer doors of buildings which are not dwellings. He must seize escheated lands, levy fines and forfeitures, and seize waifs, wrecks, estrays, etc. In Scotland the sheriff is the chief local judge of the county. His jurisdiction in civil matters extends to all civil matters not committed to other courts; his criminal jurisdiction extends to crimes which do not involve as a punishment death or banishment; and he may fine, imprison, banish from the county, and even inflict corporal punishment without a jury. In the U. S. the sheriff is the chief administrative officer of each county, and his general duties and powers are essentially the same as in England in matters pertaining to the execution and enforcement of the law, whether civil or criminal. He is the administrative organ of all the superior courts sitting within his county, charged with the duty of carrying into effect their judgments and

orders. He is wholly a state official, and has never been incorporated into the federal executive branch. He is generally elected by popular vote for a fixed term; but in a few states appointment by the governor is retained. Of his common-law judicial functions the only one retained is the assessment of damages, by the aid of a jury, in certain cases in which defendants have made default.

Sher'man, James Schoolcraft, 1855–1912; American statesman; b. Utica, N. Y.; graduated, Hamilton College, 1878, and received degree of LL.D., 1903; admitted to the bar, 1880; Mayor of Utica, 1884; chairman Republican State Convention, 1895, 1900; member of Congress, 1887–1909; elected Vice President of the United States, 1908, on the Republican ticket: renominated, 1912, but died a few days before the election.

Sherman, John, 1823–1900; American statesman; b. Lancaster, Ohio; brother of Gen. W. T. Sherman; admitted to the bar, 1844; sat in Congress, 1855–61; became chairman of the House Committee of Ways and Means; 1860, was chosen U. S. Senator; reëlected 1866 and 1872. He was prominent in debates upon finance and the conduct of the war; was one of the authors of the reconstruction measures, 1866–67; and was Secretary of the Treasury, 1877. He was again U. S. Senator from Ohio, 1881–97; president *pro tem.* of the Senate, December, 1885, till February, 1887. From March, 1897, till April, 1898, he was Secretary of State under McKinley.

Sherman, Roger, 1721–93; American statesman; b. Newton, Mass.; he was a shoemaker until 1743, when he settled at New Milford, Conn.; studied privately law, politics, and mathematics; county surveyor, 1745; made for several years the astronomical calculations for an almanac issued in New York; studied law, and admitted to the bar, 1754. He sat for several years in the colonial assembly; removed to New Haven in 1761; was assistant governor, 1766–85; Judge of Common Pleas and of the Superior Court twenty-three years; sat in Congress, 1774–93; one of the committee of five to draft the Declaration of Independence, 1776; was a framer of the Articles of Confederation, 1777, and active in the Federal Constitutional Convention, 1787; U. S. Senator, 1791–93.

Sherman, William Tecumseh, 1820–91; an American military officer; b. Lancaster, Ohio; graduated at West Point, 1840, served in the Florida War, resigned from the army, 1853, and was successively a banker, lawyer, and (1859–61) superintendent of the Louisiana military school. In 1861 he was commissioned colonel in the U. S. army, and then brigadier general of volunteers, and commanded a brigade in the first battle of Bull Run. In 1862 he took part in the battle of Shiloh and the siege of Corinth, was made major general of volunteers, May 1st, and in December attacked Vicksburg. In 1863 he led the expedition which carried Arkansas Post, January 11th, was engaged in the siege of Vicksburg, and was made brigadier general U. S. regular army. He commanded the left wing at Chattanooga, November 23d–25th, and in December raised the siege of Knoxville.

Having organized at Chattanooga an army of 100,000, he invaded Georgia, engaging the Confederates under J. E. Johnston, whom he forced to evacuate Dalton (May 12, 1864), at Resaca (15th), Cassville (19th), Dallas (25th–28th), and afterwards almost daily till the protracted operations about Kenesaw Mountain, near Marietta (June 20th–July 2d), which involved a severe repulse (June 27th). He occupied Marietta, July 3d, and repeatedly defeated Gen. Hood before Atlanta, the severest battle being fought July 22d, and began the siege of that city. August 12th he was made a major general. The battle of Jonesboro was fought August 31st. He occupied Atlanta on September 2d, and held it till the middle of November, when he began his march to the sea. He reached Savannah, December 13th, stormed and captured Fort McAllister, and on the 21st received the surrender of the city. He occupied Columbia, S. C., February 17, 1865; captured Cheraw, March 3d; and Fayetteville, N. C., on the 12th. On the 16th he fought the battle of Averysboro, and on the 19th, 20th, and 21st that of Bentonville. On April 26th the Confederates under Johnston surrendered at Durham Station, N. C., upon terms which were rejected by the Government. July 25, 1866, Sherman succeeded Grant as lieutenant general, and on March 4, 1869, as general and commander in chief; retired, 1884.

Sher'wood For'est, a hilly region in Nottinghamshire, England, about 25 m. in length by 8 in breadth. It was once a royal hunting forest, and known to legend as the scene of Robin Hood's exploits. It is now divided into farms, and it includes the town of Mansfield, several villages, and many parks and country seats.

Shet'land, or **Zetland, Is'lands,** a group of about 100 islands, of which twenty-three are inhabited, in the Atlantic, belonging to Scotland. Area, 551 sq. m.; pop. (1908) 28,166. The largest is Mainland, with the town of Lerwick; among the others are Yell, Unst, Barra, and Foula. They are all treeless, high, and rocky, with fine harbors and a wild surface. In the valleys some oats, barley, and potatoes are cultivated. The climate is mild and damp. Many cattle and sheep are reared, but the principal occupation is fishing. Eggs are an important export.

Shib'boleth, a test or password by which one's rank in society is indicated. In Judges xii, after Jephthah's victory over the Ephraimites, the men of Gilead detected their fugitive enemies by requiring them to pronounce the word ***shibboleth***, which the Ephraimites called ***sibboleth***, and thus betrayed their origin; whereupon they were put to death.

Shield, a buckler, a broad defensive weapon carried upon the arm to protect the body from blows and missiles. Most savage nations employ shields of some form, and all the nations of antiquity used them, as in mediæval Eu-

rope, down to the introduction of gunpowder. Shields were of leather, wood, basketwork, etc.

SHIELDS.

The shield is of importance in heraldry. See HERALDRY.

Shield'rake. See SHELDRAKE.

Shields, two towns of England, 8 m. from Newcastle, opposite to each other on the Tyne —N. Shields on the N. bank, in the county of Northumberland; S. Shields on the S., in the county of Durham. N. Shields has two large docks. There are large exports of coal and coke and imports of timber, grain, and esparto grass. The total tonnage entered and cleared at both ports, exclusive of that coastwise, was, in 1893, 3,540,869. S. Shields is an old town, but is well built in its modern part. On an eminence overlooking the harbor are the remains of a Roman station where coins, portions of an altar, etc., have been dug up. Pop. N. Shields (1901) 51,366; S. Shields (1904) 100,862.

Shiites (shē'ĭtz), the most numerous of Mussulman heretical sects. Their characteristics are rejection of the Sunna (see SUNNITES) and extravagant devotion to Ali, the son-in-law of Mohammed. The most advanced maintain that the revelation of the Koran was intended by God for Ali, but given to Mohammed through an error of the archangel Gabriel. The memory of the tragic death of Ali, and of his two sons, Hassan and Houssein, by murder, inflames the Shiites to this day, and is annually commemorated with bloody rites. The bitterness between the Sunnites and Shiites has never been equaled even in the most envenomed wars of Christendom. To kill one Shiite is declared by the Sunnites more acceptable to God than the slaughter of seventy Christians. The Shiites are found mainly in Persia, India, and among the Tartars. They number probably 18,000,000, and are divided into many hostile sects.

Shiko'ku, the third in importance of the Japanese islands; area, 6,855 sq. m. The mean temperature is about 59° F. The island comprises the provinces of Tosa, Awa, Sanuki, and Iyo. The surface is hilly, and there is no mountain over 4,600 ft. high. The chief towns are Kochi, Matsuyama, Takamatsu, and Tokushima. Pop. (1899) 3,013,817.

Shil'laber, Benjamin Penhallow, 1814–90; American humorist; b. Portsmouth, N. H.; was a compositor, and editorially acquired celebrity by his "Sayings of Mrs. Partington." He published "Rhymes with Reason and Without," "Poems," "Life and Sayings of Mrs. Partington," "Knitting Work," "Partingtonian Patchwork," "Ike and his Friends," and "Wide Swath," a volume of collected verse.

Shil'ling, a British coin containing 87.27272 grains of silver, .925 fine, and equal to one twentieth of a pound sterling, or to 24.3 cents U. S. Prior to Henry VII the shilling was a money of account equal to a certain number of silver pennies, fixed at twelve by the Conqueror. When the decimal system was introduced in the U. S. the shilling had a value ranging from one eighth of a dollar in New York to three fourteenths in Georgia.

Shiloh (shī'lō), an ancient town of Palestine; the present Seilun; 20 m. N. of Jerusalem. It was the seat of the Ark of the Covenant from the last days of Joshua to the time of Eli, but sank into insignificance when the Ark was carried away by the Philistines. Some Roman ruins are found on the spot, but none of Jewish origin.

Shiloh, a locality near Pittsburg Landing, on the Tennessee River, in Hardin Co., Tenn., where a battle was fought, April 6–7, 1862, between the Union forces under Grant and the Confederates under A. S. Johnston and Beauregard. The battle is sometimes called that of Pittsburg Landing. Grant had about 32,000 men, and was attacked on the morning of the 6th by Johnston with about 45,000 men, who captured three regiments and forced the army back. In the afternoon Grant was reënforced by a division from Buell, whose advance appeared on the opposite bank, and repelled an attack. The remainder of Buell's command crossed during the night, raising the Union force to about 45,000. Grant opened the action early on the 7th. A general assault followed, which was obstinately resisted till 4 P.M., when the Confederates retreated. The Union loss, as officially reported, was 1,700 killed, 7,495 wounded, and 3,022 prisoners. The Confederate loss, as reported by Beauregard, who commanded on the second day, was 1,728 killed (including Johnston), 8,012 wounded, and 959 missing.

Shimo'da, or **Simoda,** earliest Japanese port opened for U. S. shipping. It was first visited by Perry and the U. S. squadron in 1854, and became in 1857 the residence of Townsend Harris, the first U. S. representative in Japan, and it continued to be his residence until the substitution of Kanagawa (now Yokohama) in 1859. Devastated by earthquake in 1857. Pop. abt. 9,000.

Shimonoseki, or **Akamagase'ti,** town of Japan; at the SW. of the main island. It commands the strait which forms the W. entrance from the ocean to the Inland Sea. Pop. (1903) 46,285. In 1863 three vessels, U. S., Dutch, and French, were fired upon from its batteries by the Choshiu clan, and this insult was avenged by a combined fleet of these powers, acting with Great Britain, which bombarded the town. An indemnity of $3,000,000 was paid by Japan.

The U. S. Govt. afterwards refunded its share. Here in 1895 was made the treaty which ended the Japanese-Chinese-Korean War.

Shin'er, small N. American fresh-water fishes, with a compressed body and shining, silvery color; also loosely applied to other silvery fishes, as the dollar fish.

Shin'gles (a disease). See HERPES.

Shin'ney, another name for the game of HOCKEY (*q.v.*).

Shin'to (literally, "way of the gods"), the ancient cult of the Japanese. It has passed through three phases: the early stage up to 550 A.D., when it was part and parcel of the national life, and was as much political as religious; the second stage, when it had to struggle with Buddhism, which almost swallowed it entire; and the modern stage, when a brilliant band of literary men strove to identify it with a reformed patriotism and a restored imperialism, and whose views triumphed in the restoration of 1868.

Probably abt. 400 A.D. the ancestral worship out of which Shinto developed was so far organized that the home was no longer deemed sufficient, and a separate temple was erected. Over it was placed, as chief priestess, a daughter of the mikado. When Buddhism arrived in the sixth century it seems to have adopted wholesale the Shinto pantheon, and all that remained distinctive of the old ritual was the *gohei* (literally, "august cloth or present"), originally a piece of hempen cloth hung on the sacred *sakaki* (*Cleyera Japonica*) in honor of the gods. The material was changed successively to cotton, silk, and finally to paper. In modern temples all that is visible is a mirror and a bundle of these zigzag paper cuttings attached to a rod. The paper is usually white, but on occasion a succession of gohei may be seen—yellow, red, black, white, blue—in honor of the gods of wood, fire, earth, water, and metal respectively. The wand plays a considerable part in the divination with which Shinto became associated during its eclipse. The god was supposed to come and to possess the wand, and through it the gohei, the whole rite resembling closely the Shamanism of N. Asia. The priests of Shinto seem to have made clever use of the phenomena of water boiling on mountain heights at a low temperature, and of the heat-absorbing qualities of salt, in their ordeals of water and fire.

The Tokugawa shogunate strongly favored Buddhism, with its gorgeous ritual and magnificent temples; but a reaction toward the simplicity of early Japanese life and customs set in among native scholars. Satsuma, always less Buddhistic than the rest of Japan, led the restoration movement in 1868, and the result was favorable to Shinto, which became the state religion. Buddhist temples were stripped, "purified," and handed over to Shinto keeping. The revived religion, however, proved entirely too feeble to supplant Buddhism and quickly lost ground. "Pure Shinto," indeed, was largely the fad of scholars, for Buddhism had appropriated and assimilated almost everything that was dear to the people in their old religion. The Shinto temple (*yashiro* or *jinja*) differs from the Buddhist *tera* (monastery or temple) in being thatched, destitute of furniture, smaller, and usually double. The inner shrine (*honsha*) contains, in a succession of boxes, the sword (if a male deity), or mirror (if a female), which is guarded as the sacred treasure. With this mirror the mirror exposed in the outer shrine or oratory (*haiden*) has nothing whatever to do, being a loan from Buddhism. Worshipers ascend the steps, strike the temple gong with a rope, smite or rub their hands together, and then depart after throwing some coins on the floor. At the entrance to the temple is a torii, or sacred arch. Shinto morality is practically a Rousseaulike following of natural impulses, and proclaims neither heaven nor hell; its priesthood is not a caste, nor wholly devoted to a religious life; it is largely hero worship, and intensely national, and its chief deity is Amaterasu, goddess of the sun, from whom the mikado traces his descent.

Other deities are Susano, a kind of Mars, presiding over the moon; and his daughter Ugano-mitama, popularly worshiped as Inari, the goddess of rice. Most of the deities appear to be deified human beings.

Ship, vessel navigating the sea, particularly a sailing vessel with at least three masts carrying square sails, those propelled by steam being called steamers. The masts are known as fore, main, and mizzen. The mizzen is sometimes merely fort-and-aft rigged, carrying no yard; the vessel is then called a bark. Brigs have two masts with square sails, and are generally smaller than ships. Hermaphrodite brigs (partly brig and partly schooner) carry on the main mast only fore-and-aft sails. Schooners are usually two masted and fore-and-aft rigged. Sloops are small, generally less than 125 tons, with one mast, and carry a jib and mainsail; barkentines are three masted, the fore mast rigged like that of a ship, the others schooner rigged.

The nations inhabiting the shores of the Mediterranean and Red seas, and foremost among them the Phœnicians, attained high skill in shipbuilding, and made long voyages. The dimensions of Noah's ark as given in the Old Testament conform to the proportions still followed by shipbuilders. The ships represented upon Egyptian monuments were long galleys with one mast and a large square sail, furnished with oars, upon which the ships of war were wholly dependent when in action. The ships of war alone were decked, wholly or in part. For war, the long low galley gradually replaced the trireme.

In S. Europe the Genoese first built vessels propelled by sail alone. In England many such were employed as early as 1344. The *Great Harry*, built in 1488, is considered the first ship of the English navy as it is to-day. The galleasses and galleons succeeded the galleys. They were of moderate height above the water, and the galleasses had overhanging bulwarks which added to the width of the decks. The galleons were drawn in at the top so as to contract their breadth from the water line fully one half. The first English three decker was built in 1637. During the eighteenth century

the French attained superiority in the size and models of their ships. American shipbuilders were the first to abandon the cherished features of the European models, as the high poop and inflected topside. Their frigates proved their superiority in actual service, and before the introduction of steam their Liverpool packet ships were the finest vessels afloat. The river sloops and coasting schooners were peculiarly American. The schooners of the Chesapeake were especially famous under the name of Baltimore clippers. From these schooners the step was natural to the famous clipper ships by the adoption of the square rig for larger vessels of similar model. In vessels of this class the voyage round Cape Horn lost its terrors, and the passage from New York to San Francisco was confidently calculated within a few days, and this at hardly half its former length. In 1852 the *Comet* arrived in New York from San Francisco in eighty-three days, and the *Sovereign of the Seas* from the Sandwich Islands in eighty-two days. The daily average of the latter for the whole distance of 17,597 m. was 222.7 statute miles, or over 9 m. an hour for 1,896 consecutive hours.

A great change took place in the art of shipbuilding when the steam engine was applied to ships. The old proportions and forms so well suited for the speed of sailing ships and the forces impressed upon them were ill adapted for propulsion by the paddle wheel, and still more so for propulsion by the screw. The form now adopted for propulsion by the screw has been arrived at by successive steps, as experience and investigation have pointed the way. The investigations with regard to the strength of materials, the forms of least resistance, and the character of the stresses and strains brought upon ships from the action of wind and waves have brought shipbuilding almost to an exact science. See NAVY; STEAM VESSELS.

Ship Fe'ver. See TYPHUS FEVER.

Ship Mon'ey, a tax formerly laid in England to provide and furnish ships for a navy. It was first imposed abt. 1007 to resist the Danes. Ship money was among the wrongs complained of in England in 1641, and was one of the causes which led to the death of Charles I. He was in need of money, and Parliament, which alone could vote him a subsidy, he would not convoke. He then undertook to levy the so-called ship money on his own authority. In 1636 the king arbitrarily extended this tax to the inland counties and to times of peace. John Hampden was taxed twenty shillings, but refused to pay. The courts decided against Hampden, holding that the ship money was not a tax, but in 1640 and 1641 the Long Parliament declared this exaction illegal.

Ship'ping, Law of, the rules governing the ownership and employment of vessels, as well as the relations and conduct of persons on them. It is a branch of admiralty law and mercantile law.

The registry laws of the U. S. are based upon an early act of Congress (of 1792) which resembles the English statute then in force (26 Geo. III, c. 60). Only vessels built within the U. S. and belonging to citizens thereof, and vessels which may be captured in war by citizens of the U. S. and condemned as prize, or forfeited for a breach of the laws of the U. S., being wholly owned by citizens, or vessels wrecked in the U. S. and purchased and repaired by a citizen, in case the repairs cost three fourths of the value of the vessel when repaired, can be registered (U. S. Rev. Stat., §§ 4132 and 4136), with few exceptions. The place of registration is the vessel's home port. To register a vessel, the owner must subscribe the oath required by statute, must give bond that the certificate of registry shall be used solely for this vessel, must produce a certificate of construction from the carpenter who built it, and must have it surveyed. If the ship or any interest therein is sold, or if it is altered in form or burden, a new registry is required. If the vessel is not to be engaged in foreign commerce, but in the coasting trade or in fishing, instead of being registered it must be enrolled, if of twenty tons and upward, or if of less than twenty tons it must be licensed. Under this legislation U. S. ships have a virtual monopoly of the coasting trade. See COMMERCE.

Ship Rail'ways, railways for the transportation of ships overland between separated bodies of water. The connection between the water and land transportation is effected by lowering the ends of the railway tracks into the water to such a depth that the ship floats on and off a carriage or cradle. This is done by means of hydraulic lifting docks, inclined planes, or any of the other methods in common use for raising ships out of the water for repairs.

Transportation by portage is a most ancient form of artificial navigation. At the siege of Constantinople in 1453, the mouth of the Golden Horn being closed to their ships by chains, the Turks moved a fleet from the Bosporus into the Golden Horn behind the chains in a single night, over rudely constructed timberways 5 m. long, thereby doubling the line which the besieged had to defend, and largely contributing to the city's fall and the end of the Greek Empire.

The Tehuantepec Railway, proposed in 1879 by James B. Eads, was not carried out, but the principle of railroad portage has been illustrated in the Chignecto Railroad (to connect the Gulf of St. Lawrence with the Bay of Fundy) and the boat railway along the Dalles of the Columbia River.

Ship's Hus'band, the person to whom the owners of a ship delegate "the management of their common concern." The ancient practice was to confer this office on a part owner, but at present a stranger is frequently employed. The ship's husband sees to the outfit for the voyage, procures provisions and sea stores, provides proper master and seamen, looks after her legal registration and documents, as well as her clearance; engages and settles for freight, adjusts averages, salvage, etc.; enters into charter parties, and keeps accounts of contracts, payments, and receipts. The master is sometimes called the ship's husband.

Ship's Mag'netism, the disturbing effect produced on a compass by the magnetism of the

iron in a ship. So long as ships were chiefly built of wood, it sufficed to avoid the use of iron about the compass within a radius of a few yards, and, in case metal had to be employed, to substitute copper. With the increased use of iron and its special use in ships of war, and when the ship itself could be regarded as a large magnet under the earth's inductive force, the deviation of the compass assumed a vast practical and theoretical importance.

Ships of War. See NAVY.

Ship's Pa'pers, documents required by law to be carried by a vessel to show her ownership, nationality, and cargo, and to show that she has complied with the revenue and navigation laws of the country under whose laws she is registered. Although the absence of any one of the papers proper to be carried by a ship is not conclusive evidence against the neutrality or good faith of the ship, its absence renders the vessel suspicious; and when the absence is traced to willful destruction (or, as it is called, spoliation), the presumption of guilt is nearly conclusive.

Ship Sub'sidies. See SUBSIDIES.

Ship'ton, Mother (URSULA SOUTHIEL), 1488–1561; English prophetess; foretold the death of Wolsey, the invention of the steam engine, etc., but the doggerel ascribed to her, published 1862, prophesying the end of the world in 1881, was a hoax by one Charles Hindley.

Shiraz, or **Sheeraz** (shē'rāz), capital of the province of Fars, Persia; 4,500 ft. above the sea, in a valley celebrated for the abundance and excellence of its fruits. Founded in 697, it was for centuries a favorite residence of the Persian princes and a seat of science and art. Sadi and Hafiz were born, lived, and died here. Shiraz has repeatedly suffered from earthquakes. Its trade has declined, but its wine, carpets, and inlaid work are famous. Pop., 50,000.

Shir'ley, James, 1596–1666; English dramatist; b. London; took orders in the Church of England, but became a Catholic; became a dramatic writer in London; had produced thirty-nine plays before the Great Rebellion; founded a classical academy at Whitefriars, and wrote several grammatical treatises. He is regarded as the last of the Elizabethan dramatists. "The Traitor" (1631) is his best tragedy, and "The Lady of Pleasure" (1635) his best comedy.

Shirley, William, 1693–1771; colonial Governor of Massachusetts; b. Preston, England; settled in Boston, Mass., 1734; commissioner for fixing the boundary between Massachusetts and Rhode Island; royal Governor of Massachusetts, 1741–45; planned the expedition against Cape Breton, 1745; treated with the E. Indians, 1754; explored Kennebec River, erecting there several forts; commander in chief of the forces in British N. America, 1755; planned the expedition of Gen. Prideaux against Niagara; afterwards Governor of the Bahamas; author of several dramatic and historical works. His son WILLIAM was killed at Braddock's defeat, 1755. Another son, Sir THOMAS, b. Boston, became major general in the British army; was created a baronet, 1786, and was Governor of the Leeward Islands; d. 1800.

Shi'shak, the Hebrew name of the Egyptian king *Shashanq*, first ruler of the twenty-second (Bubastite) dynasty (966–800 B.C.). The dominion of Egypt was much extended by Shishak, who waged war in Palestine against Rehoboam, King of Judah. His inscriptions at Karnak contain the names of 128 cities or regions in Palestine and Syria which fell into his hands. The list is larger, but many names are no longer legible. Jerusalem was captured, and from it he removed much booty (I Kings xiv, 25, 26). Jeroboam, who had fled from Solomon, sought protection under Shishak (I Kings xi, 40), and later, upon the disruption of the Hebrew nation, became king of the ten tribes, presumably with the support and aid of Shishak. The name also belonged to the fifth, seventh, and ninth kings of the twenty-second dynasty, but particulars concerning them are meager. Their period is one of the darkest and least known in Egyptian history.

Shit'tim, (1) wood of the shittah tree, mentioned in the Old Testament as employed in building the Tabernacle. It has been identified with the *Acacia seyal*, of the Sinaitic peninsula. The wood is light, but close grained and enduring, and of a fine orange brown. The leaves are small, and in spring the tree is covered with tufts of yellow blossoms. It yields the gum arabic of commerce. (2) A fertile plain, so called from its acacia groves, opposite Jericho, in which the Israelites were encamped before crossing the Jordan. There the Israelites fell victims to the seductions of the Moabite women, who prostituted themselves in honor of Baal-peor (Num. xxv, xxxi, 1–12). Thence went the spies to Jericho (Josh. ii, 1).

Shi'va. See SIVA.

Sho'a, formerly an independent state, but since 1888 a part of Abyssinia. Area, 20,000 sq. m.; pop. est. at 1,500,000, mostly Coptic Christians. Ankobar was its capital. See ABYSSINIA.

Shoals, Isles of. See ISLES OF SHOALS.

Shock, sudden vital depression produced by violent stimulation or injuries. Surgical shock must be distinguished from mental shock caused by grief, terror, or other emotions. Shock is induced by paralysis of the vasomotor centers, but is not limited in its manifestations to the nervous system, all the tissues being affected in sympathy with the injured part. The symptoms are pallor and coolness of the face and surface of the body; a small, feeble, slow pulse; irregular respiration; pinched features; cold sweat, and the appearance of impending dissolution. Sensation of pain is annulled. If survived, shock is followed by reaction, resumption of nerve power, and revival. Extreme loss of blood and exposure to cold increase shock, and are to be avoided in operations. Railway shock is a condition which may develop some time after an accident which has

produced no apparent injury. It usually produces a general apathy and melancholia with deterioration of mind and temper, and may go on to death from general paralysis. In shock the sinking pulse must be rallied by stimulants and by heat to the extremities and surface. Hypodermic injections of digitalis, strychnine, or brandy are useful. In mild cases, warmth, a little diffusible stimulant, and rest are all that is required. Secondary, or insidious, shock is due to the formation of heart clot, and often proves fatal.

Shod'dy, a fiber made by tearing in pieces rags of worsted or combed-wool goods. The corresponding fiber of carded-wool rags is called mungo; but usually both kinds are classed together as shoddy or "devil's dust." Some useful goods cannot be profitably made without shoddy; and if used in reasonable proportion its presence cannot be detected, and the wear of the goods is not much diminished. None but the very best woolens are free from shoddy.

Shoe, any covering for the foot (except hosiery) for warmth and protection. If it consists mainly of a sole, it is a sandal; if it also has a part coming up to the ankle, it is a shoe; while one that covers a portion of the leg is a boot. A loose light shoe into which the foot may be easily slipped is called a "slipper." The earliest form of the shoe was the sandal, secured to the foot by thongs. In some parts of Europe wooden shoes, *sabots*, are common. In Japan the sandals are made of straw; in S. America they are made of plaited thongs of hemp. The early shoes of the Romans were buskins, not very dissimilar to the moccasins of the American Indians; thick soles, sometimes of metal, were a later invention.

A boot or shoe consists essentially of two parts, the sole, almost universally made of thick leather, and the upper, usually of a softer leather, but sometimes of cloth, silk, or satin. These parts are attached to each other usually by sewing. A few years ago a shoe was made throughout by a single person; now the production of a shoe is the work of many persons, each performing only a single part of the operation, a large portion being done by machinery. In no single trade is there more perfect division of labor or greater adaptation of machinery. Boots and shoes put together by pegging were in extensive use a few years ago. Now only some of the cheapest grades are pegged. One machine will sew on the soles of 800 pairs of women's shoes in ten hours. In the best grades, what difference exists between hand and machine goods is in favor of the machine-sewed goods. A great part of the boots and shoes used in the U. S., especially the finer kinds, are made in large factories in New York, Philadelphia, Baltimore, but more in towns in Massachusetts, Maine, and New Hampshire, such as Lynn, Haverhill, Brockton, Milford, Marblehead, Worcester, Braintree, and Danvers, in Massachusetts; Portland, Augusta, and Lewiston, in Maine; Dover and Farmington, in New Hampshire. Until about 1890 the U. S. did but little export business in boots and shoes.

Shoe'bill, a wading bird (*Balæniceps rex*) of the White Nile, Africa. It is named from its peculiar beak, and is also called whale-headed stork. It stands nearly 5 ft., is gray, and has a little recurved crest.

Shoe'buryness, promontory in Essex, England; opposite Sheerness; selected by the government for experimental firing at armored targets and for trial of new guns. Pop. (1901) 4,081.

Sho'gun (literally "general"), Japanese military title first employed by the Emperor Suijin in the first century B.C., when he divided the empire into four military divisions. The name began to have a political significance with Yoritomo. Henceforward the shogunate more and more represented the real governing force until, in the seventeenth century, the Tokugawas became a real reigning dynasty. The empire was centralized afresh from Yedo, so that in 1868, when the emperor resumed power, he merely fell heir to the bureaucratic system developed by these rulers.

Sholapur', name of district and city of Bombay, India. Area of district, 4,521 sq. m.; pop. (1901) 600,000. The city of Sholapur is the cotton market of the Deccan; pop. (1901) 75,288.

Shoot'ing Stars. See METEORITE.

Shore, Jane, b. 1445; mistress of Edward IV; b. London; married a goldsmith named Matthew or William Shore; became mistress of Edward IV abt. 1470, and of Lord Hastings after 1483; accused of witchcraft as an accomplice of Hastings, who was beheaded, though the reason for the proceedings against them was their partiality to the young princes. According to More, she was charged by Richard III with having withered his arm by her sorcery; was committed to the Tower and her property confiscated; was never brought to trial, but compelled to do public penance for impiety and adultery. The king's solicitor, Thomas Lynon, desired to marry her, but whether he did is not known. She survived until after the accession of Henry VIII, and legend represented her as having died of hunger in a ditch (probably derived from the name of a locality still called Shoreditch). Sir Thomas More bears testimony to her beauty, kindliness, and wit.

Short'hand. See PHONOGRAPHY and STENOGRAPHY.

Short'horns, a breed of beef cattle which originated in the valley of the river Tees, in England. They are often called Durham, shorthorned Durham, and Teeswater cattle. Shorthorns are large, symmetrical, squarely built animals, maturing early, and producing large amounts of best-quality beef. In color they are red, white, or any admixture of these two colors. Roan is a common color. A large proportion of white is not liked in the U. S. Their legs are short, the bone fine, the hair soft and thick, and the horns short, incurved, and of a waxy texture. In numbers they far exceed all other breeds of pure-bred cattle in the U. S.

Short'house, Joseph Henry, 1834–1903; English novelist; b. Birmingham. His best-known novel was "John Inglesant." Others are "The Little Schoolmaster Mark," "Sir Percival," "A Teacher of the Violin," and "Blanche, Lady Falaise."

Shortsight'edness. See MYOPIA.

Shosho'nean, or Snake, In'dians, a linguistic stock of N. American Indians. Their habitat extended from the head waters of the Missouri to S. Texas, and from W. Kansas to W. central Oregon, and the coast of SW. California. The principal Shoshonean tribes are Bannock, Comanche, Gosiute, Paiute (including the Chemehuevi), Paviotso, Shoshoni (including the Tukuarika), Tobikhar, Tusayan, Ute.

Shoshone (shō-shō'nē) **Falls,** a cataract in Idaho; formed by Snake River plunging over a cliff of trachyte 190 ft. high. Half a mile above the falls the river is 1,200 ft. broad, and flows in a cañon 800 ft. deep. At the falls the stream narrows to 1,000 ft., and descends into a gorge 1,000 ft. deep. The falls are due to the fact that the river, in deepening its channel in horizontal sheets of basalt, has reached a ridge of more resistant rock beneath.

Shot, projectiles for firearms. For those used in cannon, see PROJECTILES. The smaller sizes from buckshot to dust shot are made of an alloy of lead with one per cent of arsenic, which gives greater softness and ductility. They are made in shot towers by pouring the molten metal through colanders perforated with holes from $\frac{1}{30}$th to $\frac{1}{150}$th in. in diameter, and letting the particles fall from 100 to 150 ft. into water. Another method lessens the height through which the particles must fall in order to assume the spherical shape and harden, by using a tube through which a strong upward current of air is forced. The shot are sorted, rolled down an inclined plane so that the misshapen shot fall out, and polished in a rotating cylinder with powdered graphite.

Shov'eler, or Spoon'bill Duck, a river duck of the genus *Spatula*, so named from the widening of the bill toward the tip.

Shreve'port, capital Caddo Parish, La.; on the Red River; second city in size in the state; was capital of state during Civil War, after capture of Baton Rouge (1862). Pop. (1910) 28,015.

Shrew, or Shrew Mouse, a small, insectivorous, mouselike mammal of the *Soricidæ*, found in nearly all parts of the N. hemisphere; they are nocturnal, frequently aquatic, produce their young blind and naked, do not hibernate, and have an elongated and pointed muzzle, small eyes, plantigrade, five-toed feet, and glands which secrete a musky fluid.

Shrew Mole, genus of small mammals classed with the mole family or with the shrew mice. They are about 7 in. long, and in N. America burrow near running water, the short-tailed mole shrew (*Blavina Brevicanda*) being the best-known species.

Shrews'bury, capital of Shropshire, England; on the Severn, 163 m. NW. of London. It is an old and picturesque town, with many ancient buildings. Near here on July 21, 1403, Henry IV defeated Hotspur, and in 1644 the town was besieged by the parliamentary army. Pop. (1901) 28,395.

Shrike, any one of the *Laniidæ*, a family of passerine birds. The best-known N. American species is the butcher bird (*L. borealis*). They are noted for their habit of impaling insects and small birds upon the points of thorns.

Shrimp, crustaceans of the genus *Crangon*, usually applied to any of the smaller long-tailed crustaceans. The common shrimp of Great Britain, *C. vulgaris*, is esteemed a delicacy.

Shrop'shire, or Sal'op, county of England; area, 1,319 sq. m. Pop. (1910) 246,306.

Shrove Tues'day, the day preceding Ash Wednesday, so called from the custom of confessing and receiving shrift on that day as a preparation for Lent. It is in general a day of pleasure in most Roman Catholic countries. It is the Carnival of the Italians, the Mardi Gras of the French, and the Pancake Tuesday of England. See MARDI GRAS.

Shu'brick, William Branford, 1790–1874; U. S. naval officer; b. Bull's Island, S. C.; appointed midshipman, 1806; lieutenant, 1813; commanded a gunboat in Hampton Roads, 1813; in 1813 was transferred to the *Constitution*, and made two cruises, aiding in the capture of three ships of war; commanded the Pacific squadron, July, 1846, and during the war with Mexico captured several ports; in command of the E. coast squadron for the protection of American fishermen, 1853; commanded the Brazil squadron and Paraguay expedition, 1858–59; retired, 1861, but continued a member of the advisory board until 1870; rear admiral, 1862.

Shur (Hebrew, "wall"), Hebrew name of the desert which bordered Egypt on the E. of the Isthmus of Suez (Ex. xv, 22); named perhaps from the wall which Sesostris is said to have built from Pelusium to Heliopolis for the defense of Egypt against the Bedouin. (Trumbull, "Kadesh Barnea," pp. 44 ff.)

Siam (sī-ăm'), kingdom of central Indo-China and a buffer state between the French possessions of Tonquin and Cochin China on the E. and Burma on the W. Siam consists of three areas: the Menam basin, 400 m. long by 150 broad; the Mekong or Lao plateau, and the Malay Peninsula. The climate is tropical, but moderate and generally healthful. Siam is rich in minerals and precious stones; the production of rubies is important. The forests contain much teak and ebony. The soil is very fertile, and the staple crop, and diet, is rice. Other crops are pepper, hemp, opium, tobacco, cotton, coffee, and maize. The fauna is rich and varied. Siam is the traditional land of the elephant, and so-called white elephants are sacred and tenderly cared for. These are albinos, and the test is not so much the color of the skin as of the eyes and hair on the temples. Albino monkeys are also sacred. Simians are numerous. Edible birds' nests are

collected in such quantities that the tax on them produces $135,000 annually. Fishing is also important. The pop. (1905) est. at 6,686,864.

The Siamese, for many centuries warlike, now appear indolent, gentle, and patient. They are small but well formed, with an olive or yellowish complexion and jet-black hair; hospitable, humane, not inventive, untruthful, and capricious. In institutions they are curiously intermediate between India and China. Siam assumes the character of protector of Buddhism. Buddhism is the prevailing religion of the country and the state church. The government is an absolute monarchy. The king is assisted by a regularly constituted ministry, and there is a legislative council. More than one half the territory nominally subject to the king is included within the British and French "spheres of influence." Lower Siam is occupied by autonomous Malay states, ruled by rajahs, controlled by commissioners.

Siam appears to have no place in history prior to 638 A.D., and the credible records go back only to 1350, the date of the foundation of Ayuthia, the old capital. The Portuguese established intercourse with Siam in 1511, but in the seventeenth century were gradually supplanted by the Dutch. English traders were in Siam early in the seventeenth century, but in consequence of a massacre their factory at Ayuthia was abandoned in 1688. The French were expelled about the same time, and trade was neglected until 1856, when Sir J. Bowering's treaty again opened Siam to Europeans.

There is relatively little industry because of a system of forced labor under which each man, except a few privileged classes, owes the government three months' labor each year. Domestic slavery is little practiced, and is in process of abolishment. Free labor is difficult to obtain. Education is generally in the hands of the priests, and is much hampered by tradition.

Bangkok, the capital (pop., 400,000–600,000), is the commercial center and chief port. Rice constitutes seventy-eight and teakwood twelve per cent of the exports of Siam. The Siamese came from the N., and first appear in history, 575 A.D., when they founded Labong.

In 1893 France possessed herself of Siam's territories across the Mekong; but in January, 1896, the central region, watered by the Menan, was declared neutral by France and Great Britain, and its integrity guaranteed to Siam. In 1904 France recognized the peninsular portion and the Siamese territory W. of the Menam basin as within the British sphere of influence. During the year 1904 Siam lost control of about 7,800 m. of territory; the Luang Prabang territory to the W. of Mekong was acknowledged to belong to France, and the provinces of Maluprey and Barsack were transferred to French rule. In 1907 the provinces of Battambang, Siem Reap, and Sisophon were ceded to France, and an agreement made whereby France should hold the four ports on the Mekong on perpetual lease. In this year a portion of the Laos country was restored to Siam. By the treaty of March 10, 1909, the tributary states of Kelantan, Trengannu, and Keda, having an area of about 15,000 sq. m., were ceded to Great Britain.

Siamese' Twins. See ENG AND CHANG.

Sibe'ria, a Russian dominion occupying the whole of N. Asia; bounded N. by the Arctic Ocean, E. and SE. by Bering Strait, Bering Sea, and the seas of Okhotsk and Japan, S. by China and the Russian provinces of central Asia, and W. by European Russia, from which it is separated by the easily traversed Ural Mountains; area, 4,786,730 m., or one and a half times that of the U. S.; pop. (1907) 6,893,900. It is divided into the governments of Tobolsk, Tomsk, Yeniseisk, Irkutsk, Yakutsk, Transbaikalia, Amur, Primorskaya Oblast, and the circle of Saghalien. Beside the Urals, Siberia has a simple structure, consisting of a plateau in the SE. set in mountains, and passing to the W. and N. by an enormous plain. The remainder consists of the great plain of Asia, which in the SW. consists of steppes, grassy and sandy, and in the N. of tundras or prairies and swamps frozen for the greater part of the year. Siberia has magnificent rivers, as the Obi (3,200 m.), the Lena (2,880), the Amur (2,800), and the Yenisei (2,500). The plateau of Vitim is studded with lakes, the largest being Lake Baikal (area, 13,200 m.).

The Siberian climate is rigorous, resembling that of the Yukon or Labrador. The mean annual temperature varies from 32° F. to 15° F. It is the coldest country in the world. Siberia is celebrated for gold, platinum, and precious stones. The forest area is enormous, sometimes dense, but more often open with intervening prairies. The principal woods are cedar and larch. The N. part has the reindeer and other Arctic animals. Siberia offers abundant pastures, and millions of live stock are raised. Agriculture is primitive, but the virgin lands yield enormous crops. Exiles make five per cent of the population, and until 1900 about 20,000 were consigned annually to Siberia. Since the completion of the Trans-Siberian Railroad (from Petrograd to Port Arthur, 5,620 m.), there has been a vast increase in immigration.

After the overthrow of responsible government in Russia, an attempt was made by Germans, Bolsheviki, and radical Socialists to gain control of Archangel and, especially of Vladivostok, where enormous stores of various commodities were known to have been secreted. The Allies, including a goodly number of Americans, joined in the race for the two cities as well as vantage points on nearby waters, and got there first, and were still holding the most important places late in 1919. In the U. S. there was a strong sentiment against keeping its military contingent longer in the region, which remained quite unsettled.

Sib'yl, certain old women inspired by the god of prophecy. Plato knew of but one sibyl, Aristotle of several, and Varro of ten. Libyssa, the first sibyl, was the daughter of Zeus and Lamia, and prophesied at Delphi. The second and famous sibyl was Herophile, a sister or daughter or wife of Apollo, who is heard of even before the Trojan War. Troyland seems to have been her real home, though, from her

wanderings in the interests of her god, she was known as the Sardinian, Trojan, Samian, Delphian, Cymæan, Cumæan, Erythræan sibyl. She lived for ages, and she it was who sold the books of prophecy to Tarquinius Superbus. Upon his refusing to buy her nine books at an enormous price, she burned three and offered the remaining six at the same price. This being refused, she burned three more, and offered the three remaining at the price she had asked for the nine. Tarquinius's curiosity was aroused, and the books were bought. The twelve extant books of sibylline oracles are of late (even Christian) origin, and have nothing in common with the old sibyls.

Sicil'ian Ves'pers, the uprising of the Sicilian people against the French usurper, Charles of Anjou, at Palermo on Easter Day, March 30, 1282. In 1264 Pope Urban IV had granted the Two Sicilies to the bigoted Charles of Anjou, brother of Louis IX of France. Charles defeated Manfred at Benevento, took possession, and converted the government into an oppressive despotism. This was long borne without organized resistance, but the brutality of a French soldier toward a Sicilian woman produced an outburst of resentment which began with the massacre of the French soldiery, and ended with the slaughter of most of Charles's adherents, and the overthrow of his domination in Sicily.

Sic'ilies, The Two, a former kingdom composed of Sicily and the S. part of the mainland of Italy. In 1130 the Norman Roger, King of Sicily, having obtained the Italian territories of Apulia, Capua, Naples, and the Abruzzi, was crowned at Palermo as King of Sicily and Italy. Thus was formed a dominion whose two parts were frequently transferred from one ruler to another, with hardly any change of boundary. Ferdinand the Catholic (1479–1515), King of Aragon and of Sicily, conquered the continental Sicily, and called himself the King of the Two Sicilies, which remained united to 1706. From 1735 up to their annexation to Italy in 1860 the parts were again united, except during 1805–15, when the continental Sicily was ruled over by Joseph Bonaparte and Murat as kings of Naples. The continental Sicily comprised the five compartimenti of Abruzzi e Molise, Campania, Apulia, Potenza or Basilicata, and Calabria.

Sic'ily, an island of Italy separated from the mainland by the Strait of Messina; area, 9,936 sq. m.; pop. (1901) 3,529,799. It comprises the provinces of Caltanissetta, Catania, Girgenti, Messina, Palermo, Syracuse, and Trapani; capital, Palermo (1901) 309,694. The best harbors are Palermo, Messina, Agosta, and Syracuse. The current through the Strait of Messina causes the whirlpool at the N. end called by the ancients Charybdis. Most of the mountains are part of the Apennine system. Mount Etna rises 10,800 ft. The rivers (Salso, Simeto, etc.) are mere torrents. The mineral productions are marble, petroleum, emery, alum, salt, agates, and sulphur, the most important. The vine and olive are extensively cultivated. The other productions include sugar, barilla, cotton, sumac, saffron, manna, fruits, timber, and the mulberry. On December 28, 1908, Sicily experienced a severe earthquake which devastated much of the country in the E. portion. The loss of both life and property was enormous.

The aborigines of Sicily were the Sicanians or Siculians, but the present population is a mixture of many races, speaking a dialect much mixed with Arabic and other languages. The unequal distribution of landed property, the fatal rule of the Bourbons, the neglect of education, and other untoward circumstances have produced great misery; but the island is gradually improving, although brigandage still prevails, especially under the formidable organization of the Mafia. Wine is exported along with oranges and other fruit, grain, oil, sulphur, silk, wool, sumac, etc. The fisheries are most productive. The island abounds in ancient ruins. The first inhabitants are supposed to have come from continental Italy. The Phœnicians early founded colonies, including Panormus (now Palermo) and Eryx. The Greeks drove them into the interior, and between the eighth and sixth centuries B.C. established colonies on the coasts, among which Syracuse and Messina were most celebrated. The Carthaginians invaded the island early in the fifth century and established colonies, which after long wars fell under the power of Syracuse. The island was conquered by the Romans during the Punic wars, and became the granary of the empire. The Ostrogoths, who conquered it at the close of the fifth century A.D., were expelled in 535 by Belisarius. The Saracens occupied it abt. 830. In the eleventh century they were expelled by the Normans, who united Sicily to Naples. See SICILIES, THE TWO.

Sic'kingen, Franz von, 1481–1523; champion of the Reformation; b. near Kreuznach, Rhenish Prussia; was one of the wealthiest and most powerful knights of his time. He spent all his time in feuds with his neighbors, and, having come into contact with the new religious ideas through his friend, Ulrich von Hutten, he formed a plan of carrying through the Reformation by force. As the despoiling of the Roman Catholic Church and the distribution of its estates among the knights formed the principal points of his plan, he expected support from the nobility, and pamphlets were spread among the peasantry to arouse them, too, against their ecclesiastical lords; but the attempt failed, and at last he was compelled to surrender himself, together with his last castle, Landstuhl.

Sick'les, Daniel Edgar, 1825–1914; American military officer; b. New York; admitted to the bar, 1846; member of Congress, 1856–1862. In 1859 he shot and killed Philip Barton Key for improper intimacy with his wife, and was tried for murder, but acquitted. In June, 1861, was appointed colonel of the Seventieth New York. In September, 1861, he was nominated brigadier general, and later major general, of volunteers. He was distinguished at the battle of Chancellorsville, May 3d–4th. At Gettysburg he lost a leg early in the second day's fight. In 1865–67 he commanded the military district comprising N. and S. Carolina. In 1869 was

retired, with the rank of major general U. S. army; U. S. minister to Spain, 1869–73. In 1892 was elected to Congress.

Sicyon (sĭsh'ĭ-ŭn), capital of the province of Sicyonia, in the Peloponnesus, bounded N. by the Corinthian Gulf, W. by Achaia and Arcadia, S. by Cleonæ and Phliasia, E. by Corinthia. Its site is occupied by the village of Vasilika. Sicyon was distinguished as the original home of painting and bronze casting. In history Sicyon played only a secondary rôle.

Sid'dons, Sarah, 1755–1831; British actress; daughter of Robert Kemble; b. Brecon, S. Wales; made her first appearance at Drury Lane, with Garrick, as *Portia*, in 1775, but made no mark; retired in disappointment, but played in the provinces with success, and reappeared in London in 1782. This time she made a deep impression as *Isabella* in "The Fatal Marriage." For thirty years, until her retirement, 1812, she was the queen of the English stage. Her famous characters were *Lady Macbeth*, *Queen Constance*, *Queen Catharine*, *Jane Shore*, *Isabella*, *Ophelia*, *Desdemona*, *Portia*, and *Imogen*—impersonations of tragic pathos and majesty. To her contemporaries she was a prodigy of genius. Her effects were produced by presence, mien, attitude, expression of voice and countenance, and by intense concentration of feeling, which lifted and dilated her form, transporting her audience as well as herself. The public readings she gave from Shakespeare did not add to her fame.

Sid'ney, Algernon, 1622–83; English statesman, son of the Earl of Leicester and grandson of Sir Philip Sidney. In May, 1644, he was commissioned a captain in the parliamentary army, and fought gallantly at Marston Moor. In 1646 he was lieutenant general of horse in Ireland and Governor of Dublin, and entered Parliament. He acted as one of the judges of the king, but refrained from signing the warrant for his execution. Being opposed to Cromwell's protectorate, he retired in 1653. On May 13, 1659, he was nominated one of the Council of State. He was absent from England at the time of the Restoration, and, unwilling to return to his native country while it remained under "the government of a single person, kingship, or House of Lords," he remained a voluntary exile for eighteen years, chiefly in S. France. He returned in 1677, and soon became an active opponent of the court, but was defeated in two attempts to enter Parliament. The discovery of the Rye House plot in June, 1683, led to his arrest on a charge of complicity with the conspirators. He was tried before Judge Jeffreys, and condemned and executed almost without evidence. His attainder was reversed by the first Parliament of William and Mary. His "Discourses Concerning Government" were published in 1698.

Sidney, or Sydney, Sir Philip, 1554–86; English author and statesman; b. Penshurst, Kent; studied at Oxford and at Cambridge, and traveled extensively; noted for his skill in knightly exercises as well as for his fondness for literature and art. In 1576 he was sent on a mission to Vienna, but after his return lost the queen's favor, perhaps for opposing her marriage to the Duke of Anjou. In retirement he wrote his pastoral romance, "Arcadia," which was never completed, and his "Defense of Poesie," upon which his literary fame mainly rests. The queen's favor for him revived. He fell in love with Lady Penelope Devereux, whom he celebrated in his "Arcadia," and in the series of sonnets entitled "Astrophel and Stella." In 1583 he was knighted, and married the daughter of Sir Francis Walsingham. In 1585 he wished to join Drake in his second expedition against the Spaniards, but the queen forbade this, fearing, as she said, "lest she should lose the jewel of her dominions." In 1585 Sidney was appointed Governor of Flushing, and soon after gave promise of much military ability in the war between Spain and the Netherlands. On September 22, 1586, at Zutphen, Sidney was severely wounded, and died at Arnheim, October 7, 1586. The well-known story of his refusing the cup of wine, when fainting from loss of blood, in order to give it to a wounded soldier, saying, "Thy necessity is greater than mine," whether true or false, illustrates his chivalrous and generous character. A general mourning, the first of the kind in English history, was observed for him. He is the best English model of knightly virtues, and his character has always been a favorite theme with poets. His writings had great celebrity, but are marked by a strained and artificial style.

Si'don, or Zidon, an ancient city in Phœnicia, on the Mediterranean. Its origin, lost in antiquity, is due, according to Josephus, to Sidon, son of Canaan, and it is referred to in Genesis. Celebrated for manufactures and trade, its name was applied to the whole nation. Homer calls the Sidonians "skillful in all things." Sidon had trade stations in Sicily, Sardinia, Spain, and N. Africa; its fleets visited the British Islands and the Baltic; and its purple, glass, linen, gold, silver, and ivory wares were famous. Its most brilliant period began 1600 B.C., but it was eclipsed by Tyre. Captured by Shalmaneser, King of Assyria, abt. 720 B.C., it suffered during its revolt against Artaxerxes (351 B.C.). Under the Greek, Syrian, and Roman dominion, it further declined. Alternately held during the crusades by the Christians and Mussulmans, it was razed by Malek Ashraf in 1291. In the vicinity were discovered (1887) sarcophagi of unsurpassed workmanship, one of which is perhaps that of Alexander the Great.

Sido'nius Apollina'ris. See APOLLINARIS SIDONIUS.

Sid'ra, Gulf of. See SYRTIS.

Siege, the investing of a fortified place by an enemy to compel its surrender. Modern fortresses are of two general types—single fortresses, consisting of an enceinte and its outworks, and intrenched camps, consisting of the former combined with detached works. The latter may be defended simply by its garrison or by a large army in addition to the garrison. The methods of attack may be classified as

(1) siege of a single fortress; (2) siege of an intrenched camp defended by its garrison simply; and (3) siege of an intrenched camp occupied by an army.

The method perfected by Vauban in the seventeenth century applied to the first case, and under ordinary circumstances with the proper force—five or six times the garrison—was certain of success. This method has been employed without essential change for two hundred years, and it is only recently that some modifications have been introduced. It consists in taking an intrenched position beyond the range of artillery, and clearing a path thence to the interior. To do this it is necessary to subdue the fire of the work, to batter down a portion of the scarp, and to excavate a path by which troops can advance under cover. The occupation is called the investment. The intrenchments on the side of the work are lines of countervallation. Sometimes defenses are thrown up to guard against attack from the exterior; these are lines of circumvallation. The covered roads constructed toward the work are approaches, zigzags, or boyaux. To prevent their being enfiladed they are run zigzag, each branch being so placed that its prolongation shall fall outside the salients of the collateral works.

At first these approaches are constructed by digging a trench and throwing the earth up to form a simple trench. When within easy range of artillery, cover is obtained by placing a row of gabions and filling them with earth. This is a flying sap. During the latter portions the excavation is pushed forward by sappers, foot by foot, under a rolling shield called a sap roller. It is revetted with gabions, and is called a full sap. As the heads of these approaches offer an easy prey to sorties, they are united from distance to distance by trenches parallel to the front of attack. These are called parallels. Each parallel should be nearer to the preceding one than it is to the work attacked, and must be within easy supporting distance from it. In Vauban's time there were usually three parallels; at Sebastopol, 1854–55, there were seven. When the approaches have advanced within easy artillery range, batteries are constructed, if practicable, on the prolongation of the faces of the work. The artillery fire having been subdued, the approaches are pushed forward toward the crest of the glacis. The occupation of the crest of the covertway is called the crowning of the glacis. Here, in the old method, breaching batteries were constructed to batter down the scarp, and a gallery was excavated to lead into the ditch, the advance through the ditch and breach being continued with the fall sap or by assault. In these operations the miner goes hand in hand with the sapper. He searches out and destroys the countermines, creates large craters in which the sapper can make lodgments, and is often employed to make the breach.

The driving of a full sap, always difficult, is of late years impracticable, assuming that the defense is vigorous. The prompt capture of many of the single fortresses of France during the Franco-German War of 1870–71 has but little bearing on the subject, as many of them were of an ancient pattern, none was in a complete state of preparation, the artillery was inferior to that of the enemy, and the defense was often lukewarm or unintelligent, or both. The method of the Germans was to observe the places by detachments until operations in the field afforded leisure. for a serious attack against them, and then to plant powerful batteries at distances varying from one to two miles, and bombard them until they capitulated. For instance, Strassburg, with a garrison of 17,000, resisted for fifty-one days an army of 60,000. The attack was by regular approaches, the outworks being breached by distant fire and by mining, and the main rampart by the fire of batteries in the second parallel. These demolition batteries were 800 yds. from the place, and effected their purpose by indirect firing, the masonry not being visible. The crowning of the glacis was accomplished, followed by the descent into the ditch. The ditches, being filled with water, were crossed by dams, or by floating bridges of barrels floored over with planks. Everything having been prepared for the assault, the garrison capitulated.

In a vigorous defense of a single fortress the enemy will be kept at a distance as long as possible by the occupation of favorable points on the exterior. His approaches and other works will be harassed or destroyed by artillery fire, with occasional sorties. Counter approaches will be run out to obtain favorable positions for enfilading, and sharpshooters will pick off his gunners. Counter mines will be prepared and sprung. Damage to the works suffered during the day will be repaired at night. Débris will be removed from the foot of the breach, and when the latter has become practicable it will be obstructed by chevaux-de-frise, or other obstacles, and intrenchments will be thrown up to command it. If the garrison has not been overworked, the assault should be repulsed.

That a well-managed assault may be successful against an intrenched camp was proved by the capture of Kars by the Russians, November 17–18, 1877. The defenses consisted of twelve detached permanent forts and a citadel. They were manned by a garrison of 23,000 Turks armed with the best breech loaders. The attacking force was 35,000. The Turks are considered the equals of any troops when fighting in a fixed position, as behind fortifications, yet this assault resulted in the destruction of the entire garrison, with the exception of thirty or forty men. The most prominent features of its management were that no intimation had been given to the enemy that it was contemplated, the points of attack were skillfully selected, the columns attacked simultaneously, and a moonlit night was selected for it, when the light was sufficient to prevent confusion, though not sufficient to expose the columns to the enemy.

In early war, when the arms were slings and arrows, the high thick walls of fortresses offered insuperable obstacles. Sieges then were simple blockades. Later mining was resorted to; ramps of earth and wood were thrown up, beginning beyond the range of an arrow, and sloping upward to the top of the wall; or the

battering ram was employed to effect a breach. The method among the Greeks and Romans was as follows: The place was surrounded by a strong continuous intrenched line. In front of the point of attack a covered gallery was established parallel to the work, composed of vines. A vine was a hut on wheels, 8 ft. wide, 20 ft. long, and 7 ft. high, with a double-sloped roof strong enough to resist anything the besieged could throw upon it, and covered with raw hides or clay to protect it from fire. It was closed in front with loopholed wickerwork. From this parallel gallery several similar galleries were run forward, the head of each being occupied by a special vine, having an overhanging roof projecting 10 ft. to the front, under cover of which workmen leveled the ground or built up the ramp. Through these galleries the material was carried forward to fill up the ditch. When the wall was reached, the battering ram was brought up, covered by a hut similar to that of the vines. In great sieges these attacks were supported by square wooden towers, moved up to the walls on wheels or put together on the spot; in their lower stories they contained rams; in the middle, drawbridges, which could be lowered upon the walls; and in the upper stories, parapets of hides, to protect slingers and archers. They were sometimes 150 ft. high, and had from ten to twenty stories. Towers of these dimensions, however, could not be moved. When the ramp rose, the besieged raised the wall opposite to it; and when the towers were constructed, they increased the height of those on the ramparts. They opposed the enemy's works by mining and inundations and by fire. Gunpowder rendered the wooden approaches and towers useless, and the vines were replaced by trenches.

At Yorktown, Va. (April and May, 1862), a parallel was constructed about a mile from the works, and heavy batteries established, but the enemy evacuated before the batteries opened fire. Other famous sieges in the Civil War were at Vicksburg and Petersburg, the fall of the latter necessitating the evacuation of Richmond. The sieges of Ladysmith and Mafeking in the Boer War, and of Port Arthur in the Russo-Japanese War, have greatly developed the theory and practice of attack and defense of fortified places. See BLOCKADE; BOMBARDMENT.

Sieg'fried. See SIGURD.

Sie'mens, Ernst Werner von, 1816–92; German electrician; b. Lenthe, Hanover; entered the Prussian artillery, 1838; took out a patent for electroplating and gilding in 1841, and laid in 1848 the first submarine mines exploded by electricity; left the army in 1849, and founded a telegraph-building establishment. Among the many inventions which are due to him are the methods of determining the position of injuries in subterranean and submarine lines, of examining insulated wires, of charging subterranean and submarine conductors in order to lessen the disturbing influences of induced currents in the cables. His brother, Sir WILLIAM (Karl Wilhelm) SIEMENS, 1823–83, physicist, b. Lenthe, settled, 1843, in London as a civil engineer, and founded a branch of the Berlin house. He invented the regenerative furnace, in which he utilized the heat which would otherwise escape, the bathometer for measuring ocean depths, a pyrometer, etc.

Sienkiewicz (syĕn-kyĕ'vĭch), **Henryk,** 1846– ; Polish novelist; b. Siedlce, Polish Russia. Many of his works have been translated into English (by Jeremiah Curtin) and other languages. Among them are: "With Fire and Sword" (1884); "The Deluge" and "Pan Michael" deal with the resistance of the Poles to invaders; "Without Dogma" (1890) is a psychological story; "Children of the Soil" (1894) deals with the hollowness of modern life; and "Quo Vadis" (1895), a story of Roman and Christian life at the time of Nero, which had immense popularity. He was nominated for the Douma, 1906, but declined to serve. He is regarded as the representative of Polish independence, and has incurred official displeasure, and even nominal imprisonment, for opposing Russian influence in Polish schools.

Sien'a, or **Sienna,** city of Tuscany, Italy; chief town of province of Siena; 60 m. S. of Florence. The principal streets radiate in irregular lines from the Piazza Vittorio Emanuele, a fine large open space. The Duomo, or Chiesa Metropolitana, one of the finest specimens of Gothic architecture in Italy, stands near the center of the town. The W. façade is magnificent in color and in the richness of its sculptures. The effect of the interior is peculiarly picturesque, partly from the horizontal layers of black and white marble of which not only the walls but even the columns are composed, and partly from the roofing, which is a vault of blue studded with stars. There are cloth and furniture factories, but the industries are small.

As early as the reign of Charlemagne Siena was governed by a count. In the disputes between the papacy and the emperors it at first took the side of the former, and, like its neighbors, Florence and Pisa, developed into an independent commonwealth. In 1186 Siena joined the Tuscan commonwealths in resistance to Henry, son of Frederic Barbarossa, but after some successes was reconciled to the emperor, and thenceforward it continued steadfastly Ghibelline. In 1260 the Sienese inflicted a defeat on the Florentines at Montaperto, but hostilities were frequently renewed. A plague, known as the black death, broke out in 1348, and continued until the close of the century. During the first year 80,000 persons perished. In 1480 the government of the commonwealth fell into the hands of Pandolfo Petrucci, who directed public affairs successfully until 1512. After his death the Medici, with Spanish help, annexed Siena to Florence. From this time its history is almost one with that of Tuscany. Pop. (1907) 38,665.

Sienna, ocherous earth which, ground, forms a pigment called raw sienna, and when burned assumes a richer orange-red tint. It comes from Italy.

Sierra Leone (sĭ-ĕr'rā lē-ō'nē), British colony on the Guinea coast, Africa; area about 4,000

sq. m. The soil is fertile, but the climate is extremely hot and unhealthful. The rainfall at Freetown is about 110 in. All tropical plants grow luxuriantly, and palm oil, pepper, ginger, gum copal, ground nuts, etc., are exported. Sugar, coffee, indigo, and cotton have been introduced. The settlement was made in 1787 to form a home for free negroes, and the colony is steadily growing. The chief products and exports are palm oil, palm kernels, benni seeds, ground nuts, kola nuts, india rubber, coal, and hides. Capital, Freetown; pop. (1901) 76,655, with 444 whites.

Sierra Madre (sē-ĕr'rä mä'drā), or **Sierra Madre del Pacífico**, irregular chain of mountains which frames the W. of the Mexican plateau. It is a continuation of the mountains on the W. border of the Great Salt Lake basin, and the name Sierra Madre is applied to it also in S. Arizona. On the E. or plateau side the declivity is gentle, but the Pacific side has steep slopes, precipices, and magnificent scenery. Few of the peaks exceed 10,000 ft. The chain is broken, and often there are parallel ranges. In Jalisco, especially, there are deep cañons. The higher slopes are covered with pine forests. The Sierra Madre del Sur, in S. Mexico (Guerrero, Oajaca), is an E. and W. range, near the Pacific; apparently it has no structural connection with the Sierra Madre del Pacífico. The mountains forming the E. border of the plateau are sometimes called, collectively, the Sierra Madre del Oriente or E. Sierra Madre.

Sierra Morena (mō-rā'nä), mountain range of Spain, separating the basin of the Guadiana from that of the Guadalquivir. Its aspect is rugged and somber; its summit is Aracena, 5,500 ft.

Sierra Neva'da (Spanish, "snowy mountains"), range of S. Spain, 75 m. long and 25 broad, between the Guadalquivir and the Mediterranean. Its peaks are Mulahacen, 11,658 ft., and Veleta, 11,387 ft., and has received its name from the perpetual snow and ice on many of its peaks. Its S. slopes are clad with chestnut forests, olive and orange groves, and vineyards.

Also the name of a mountain range of E. California, separating the valley of California from the basin of Nevada. The range is continued at the N. by the Cascade Mountains, and at the S. turns SW., uniting with the coast ranges. It is a broad plateau inclined toward the W., except at the extreme N., where it divides into several ridges. The crest line and peaks are along the E. margin, and the E. slope is steep. The long W. slope is broken by cañons. Among its highest peaks are Dana (12,992), Lyell (13,042), Brewer (13,886), Tyndall (14,386), and Whitney (14,898), the loftiest point of the U. S. S. of Alaska. The snowfall on the W. slope is heavy, and its rivers irrigate the Californian valley. The E. slope is characterized by the arid climate of the interior basin. Among the peaks are a few small glaciers.

Sieyès (sē-yäs'), **Emmanuel Joseph** (known as the ABBÉ SIEYÈS), 1748–1836; French publicist and statesman; b. Fréjus; educated for the Church, and became vicar general and chancellor to the Bishop of Chartres, 1784. He had attained some reputation as an acute thinker when, in 1789, he attracted attention by his pamphlet, "Qu'est-ce que le Tiers État?" and having been elected to the States General by Paris, he became the actual leader of the assembly, and originated some of the most decisive steps toward the revolution. He proposed that the three estates should examine their credentials in common; and his pamphlet, "Reconnaissance et Exposition des Droits de l'Homme et du Citoyen" (July, 1789), was the immediate occasion of the declaration of the rights of man. The new administrative division of France into departments was due to him. As the revolution ceased to be a philosophy and became a passion, Sieyès lost influence.

In the convention he voted for the death of Louis XVI without any appeal to the people, and during the Terror he disappeared from public life. After the fall of Robespierre he returned, was employed in diplomatic negotiations, and became a member of the Directory, May 16, 1799; and it was he as much as, if not more than, Bonaparte who carried through the coup d'état of the 18th Brumaire (November 9, 1799), by which the Directory was overthrown and the consular government instituted, he himself being chosen one of the three consuls. Finding that this, the best beloved of the various constitutions which he had framed, was disregarded, and that he had brought in a military despotism with Napoleon as First Consul, he retired and took little part in politics. Napoleon enriched him and made him a count of the empire. After the restoration, Sieyès was banished as a regicide, and went to Brussels. After 1830 he returned to Paris, and died there.

Sigel (sē'gĕl), **Franz**, 1824–1902; German-American military officer; b. Sinsheim, Baden. Took part in the revolutionary movement of 1848; led a corps of 4,000 men through the Black Forest to the attack of Freiburg, and, narrowly escaping capture, he fled to Switzerland. In 1849 was Minister of War of the revolutionary authorities; took part in the unsuccessful campaign against the Prussians; went to England, and then embarked for the U. S.; was teacher of mathematics; professor in a college in St. Louis; was, in 1861, colonel of the Third Missouri Volunteers; fought the battle of Carthage, July 5th; commissioned brigadier general; commanded a division under Frémont in S. Missouri. He tendered his resignation in consequence of unpleasant relations with Gen. Halleck; summoned to Washington, and made major general; in command of Harper's Ferry, June 2d; served under Pope in his Virginia campaign, and in the second battle of Bull Run; became commander of the Department of W. Virginia; was defeated by Breckenridge at Newmarket, May 15th, and relieved from command; resigned May 4, 1865. He was U. S. pension agent for New York, 1885–89.

Sigh'ing, a full, long, and slow inspiration, which is immediately followed by a more rapid expiration, unusually prolonged and character-

ized by the presence of a sound as air passes out of the mouth. Although usually a reflex act, presumably excited by an almost imperceptible sensation due to imperfect aëration of the blood, sighing is often voluntarily performed, although it is in some respects not a perfect counterpart of that which is produced reflexly. It ordinarily takes place about once in every six respirations, but when the attention is concentrated upon some subject of great interest, the reflex excitability is diminished, and then, when the mind becomes disengaged, the act of sighing is so prominent as to attract notice. The apparent object of sighing is to aërate the blood more perfectly than ordinary respiration, and through it the lungs are more effectually filled and emptied than would be the case were the breathing uniformly regular. Sighing is not peculiar to the human species, but is a normal phenomenon of respiration in all mammals.

Sight. See EYE.

Sigilla'ria, a genus of fossil trees of the Carboniferous period. Trunks have been found 5 ft. in diameter and 70 ft. long. The roots called *Stigmaria* belong, at least in some instances, to this genus.

Sig'ismund, 1362–1437; Emperor of Germany, 1411–37; the last of the house of Luxemburg; son of Charles IV; received the margraviate of Brandenburg, while his elder brother, Wenceslaus, King of Bohemia, succeeded as emperor. Having been betrothed to Maria, the eldest daughter of Louis the Great, King of Hungary and Poland, he became heir-apparent to these two crowns. But on the death of Louis (1383) the Poles chose his younger daughter, Hedvig, queen, Charles Durazzo seized the regency in Hungary, and Maria was kept in captivity by John Horvath, ban of Croatia. Sigismund rescued and married her, and was crowned King of Hungary in 1387. He then undertook a war against the Turks, supported by the German and French chivalry, but was routed at Nicopolis (1396) by Bajazet, fled to Greece, and found, when in 1401 he returned to Hungary, his queen dead, his throne occupied by Ladislaus of Naples, and his brother deposed in Germany, and vindicating himself only with difficulty in Bohemia. In 1403 he expelled Ladislaus, and took possession of Hungary, and in 1410 was even elected Emperor of Germany. In 1414 an ecumenical council was convoked at Constance, to end the schisms in the Church and reconcile the Hussite party. He gave his assent to the decree of the council condemning Huss to be burned, and the Hussite war began.

Sigismund, name of three kings of Poland of the Jagellonian dynasty: SIGISMUND I, THE GREAT, 1466–1548; son of Casimir IV; succeeded his brother Alexander in 1507. His was probably the most successful reign in the history of Poland. A treaty with the Turks gave Poland the free navigation of the Black Sea, the sovereignty of Moldavia, and secured her against the Mongols. He curbed the arrogant nobility; was prudent in his expenses, and a patron of literature; and he favored the Reformation, which from Germany spread rapidly among the Poles. After the death of his first wife, Barbara Zapolska, he married Bona Sforza, of Milan, an intriguing, avaricious, and licentious woman, who exercised great influence over him, and alienated to some extent the love of his subjects from him. He was succeeded by his son, SIGISMUND II, AUGUSTUS, 1520–72, who, although educated purposely by his mother in effeminacy and dissoluteness, opposed the ambitious schemes of the queen-dowager with decision. At the Diet of Lublin (1569) Sigismund succeeded in uniting Lithuania to Poland, and at the Diet of Warsaw (1572) he granted religious liberty, but the intolerance of the nobles prevented freedom of worship to the serfs. Volhynia, the Ukraine, and Livonia were also incorporated, and his reign was, in both external and internal respects, a period of great prosperity. With him the male line of the Jagellonian dynasty became extinct. His sister Catharine, who was married to John III, King of Sweden, had a son, Sigismund, who was elected King of Poland as SIGISMUND III after the death of Stephen Báthori (1587); but his only aim was to unite Sweden and Poland, in order to re-establish Catholicism in the former and suppress the Reformation in the latter. In 1592 John III died, and Sigismund succeeded him as King of Sweden, but in 1604 he was formally deposed, and his uncle, Charles IX, was crowned. Unwilling to give up his claims, he began a series of wars with Sweden which contributed to the ruin of Poland.

Sig'maringen. See HOHENZOLLERN.

Sign, in astronomy, a portion of the ecliptic, containing a twelfth part of the complete circle, or 30 degrees. The first sign begins at the point of the equator through which the sun passes at the vernal equinox in the upper hemisphere, and the signs are counted onward, proceeding from W. to E., according to the annual course of the sun. The signs and their characters are as follows:

♈, Aries, *Ram.*	Spring.
♉, Taurus, *Bull.*	
♊, Gemini, *Twins.*	
♋, Cancer, *Crab.*	Summer.
♌, Leo, *Lion.*	
♍, Virgo, *Virgin.*	
♎, Libra, *Balance.*	Autumn.
♏, Scorpio, *Scorpion.*	
♐, Sagittarius, *Archer.*	
♑, Capricornus, *Goat.*	Winter.
♒, Aquarius, *Waterman.*	
♓, Pisces, *Fishes.*	

The first character, ♈, indicates the horns of a ram; ♉, the head and horns of a bull; ♊, the ancient statues of Castor and Pollux; ♋, the claws of a crab; ♌, a corruption of the Greek letter Λ, initial of *Λέων*, lion; ♍, corruption of *παρ* for *παρθένος*, virgin; ♎, scales; ♏, the tail of a scorpion, or the legs and tail; ♐, an arrow; ♑, for *τρ*, initials of *τράγος*, goat; ♒, running water; ♓, two fishes joined.

SIGN, in algebra, a symbol indicating a relation subsisting between two quantities, or an operation to be performed. Of the latter, those most commonly used are +, denoting addition; −, subtraction; ×, multiplication; ÷, divi-

sion; $\surd$, square root; $\sqrt[3]{}$, cube root; and $\sqrt[n]{}$ *n*th root. The signs denoting relations are: =, equal to; >, greater than; <, less than, etc.

Sig'naling, transmitting of intelligence by signals appealing to sight or hearing, especially in the army and navy. Few persons without experience have any idea of the remarkable ranges at which signals made by motions are visible to the naked eye, or the wonderful gain had by the use of a simple pocket telescope. Signaling at 5 m. is held by experienced signalists to be at very short range. Messages have been sent 10 m. by means of a pocket handkerchief attached to a 12-ft. rod. With the flags and staffs in use in the Signal Corps of the U. S. army communication is said to have been had at 25 m. distance, and detached words have been read at 40 m.

The means of communication by day are flags, heliograph, and the field telegraph and telephone trains; and by night the torch, flash lantern, rockets, bombs, and search light. The method of visual signaling by flags consists in waving a flag to the right for a dot, to the left for a dash, and to the front for the space in the American Morse code. Thus the motions

Right, right, front, right represent C.
Right, front, right represent O.
Right, front, right, right represent R.
Right, right, front, right, right represent Y.
Right, right, right, front, right represent Z.
Right, front, right, right, right represent &.

The code in use by the U. S. navy is contained in two books known as the "The General Signal Book" and the "Fleet Drill Book." The first contains about 7,000 words and sentences, arranged alphabetically and regularly numbered. There is also a vocabulary of some 10,000 conversational words and, in addition, an alphabet and geographical list of nearly 11,000 plans, each letter and word having its appropriate number. As its name indicates, the "Fleet Drill Book" relates to the tactical formations of a fleet or squadron. All that is necessary to establish communication by a vessel having a set of these books is to indicate the volume and the number in that book corresponding to the required words or sentences. For day signaling there are nine rectangular flags representing the digits, one to stand for zero or ten and three triangular pennants, called repeaters, wherewith to make duplicate numbers. For example, the sentence, "Anchor in order of steaming," may stand opposite the number 112 in the signal book. To indicate this number the flag representing No. 1 is set or bent on the signal rope or halyard, then the first repeater pennant, and lastly signal flag No. 2. Then the entire signal is raised. Had the number been 144, flag No. 4 would have followed No. 1 and the second repeater pennant would follow No. 4, indicating that the second figure was to be repeated. The flags are read in their order of height, the lowest flag in the hoist representing units. Besides the above-named flags there are the cornet, the danger signal, the guide flag, the annuling flag, the telegraph flag, the dispatch, quarantine, and convoy flags; also pennants known as the answering, preparatory, interrogatory, numeral, geographical, and position, their names indicating their use, except the cornet, which indicates a vessel's number in one case and is used as a recall in another. Visual signaling with flags of various colors can only be used for distances a little over 3 m. For greater distances a semaphore, collapsing drum or cones, balls or squares are used, the shape or position taking the plan of color. Night signals are made by fire balls or stars, which are shot to a height of about 400 ft. The colors used are red and green. Rockets are used to indicate the ship's number and as signals of execution. Colored electric lights are now used for night signaling, and are hoisted on a halyard as are the signal flags. The search light is also used for signaling to a ship beyond the horizon by flashing the light on a cloud. Dots and dashes may be used, making it possible to employ the Morse telegraph code. Fog signals are made by striking a bell, blowing a whistle, firing guns, or blowing horns. Long and short blasts of the whistle may be used to represent the two elements of the telegraph code. Flags mounted on a staff are also used in the hands of signalmen to transmit messages either by the Morse telegraphic code or by the army code. In the former a dot is indicated by waving the flag to the right and returning it to the perpendicular, a dash to the left, the end of a word by dropping flag to the front once, the end of a sentence twice, and the end of a message three times. The army code originated by Gen. A. J. Myer uses the numbers 1, 2, 3. Waving the flag to the right indicates 1, to the left 2, and to the front 3. The letter A would be 22, B 2112, etc. There has been adopted an international code of signals and flags by means of which ships of the different nationalities are able to communicate with one another. See HELIOGRAPHY.

Signorelli (sēn-yō-rĕl'lē), **Luca,** 1441–1525; Italian painter; painted two frescoes in the Sistine Chapel at Rome, but his greatest works are frescoes in the Cathedral of Orvieto.

Sigourney (sĭg'ŭr-nĭ), **Lydia Howard** (HUNTLEY), 1791–1865; American poet; b. Norwich, Conn.; established a school for young ladies; published "Moral Pieces in Prose and Verse," and was thenceforth through a long life one of the most popular of American poets. She published fifty-nine volumes of poems, essays, and letters, chiefly on moral or religious themes. Among her works were "Letters to Young Ladies," "Zinzendorff, and other Poems," "Pocahontas, and other Poems," "Pleasant Memories of Foreign Lands," "Past Meridian," and an autobiography, "Letters of Life."

Si'gurd, or **Sigurdr,** in N. mythology, the hero of the Volsunga Saga, on which the Nibelungenlied is based. According to the legend of the Volsungs, Sigurd (the Siegfried of the Nibelungenlied) is the posthumous son of Sigmund, son of Volsung, a descendant of

Odin. After obtaining the golden treasure by slaying the dragon Fafnir with his good sword Gram, he eats the monster's heart, and thus acquired the power of understanding the songs of birds. He then rides through a volume of flame surrounding a house in which the fair Brenhyldr (Brunhild) lay asleep. He wakes Brenhyldr, to whom he plights his troth, and then rides to the palace of Giuki the Niflung, whose wife gives him a potion which causes him to forget Brenhyldr, and he marries Gudrun (Chriemhild), Giuki's daughter. Her brother Gunnar (Gunther) determines to marry Brenhyldr, but is unable to ride through the flames; so his mother by her arts causes Sigurd to go through the flames and bring away Brenhyldr in the form of Gunnar. Sigurd then resumes his shape, and Brenhyldr is handed over to Gunnar. When Brenhyldr hears the true story of her rescue her love for the hero turns to hatred, and she seeks to slay him. Sigurd is eventually killed by Gunnar's half-brother. His death revives Brenhyldr's love and she dies of a broken heart.

Sikhs (sēks), the disciples or followers of Nanak, a religious reformer, born in Talwandi, now Nankana, near Lahore, 1469 A.D. They form the principal native element of the Punjab. Nanak was a Hindu by birth, of the Khattri caste, and the son of a village official. In his early years he sought the society of ascetic monks. At fifteen he misappropriated the money which his father had given him for trade, and gave it to religious mendicants. His father tried to wean him from his affection for a monkish life, but he still continued to give his earnings to mendicants. When engaged in religious exercises he was translated bodily, so he said, to the gates of Paradise, and received a golden goblet of *amrita*, or the "water of life." Then God said to him, "Nanak, I am with thee, and whosoever shall follow thee shall be happy indeed." Nanak recovered from the trance, and uttered those words which have become the keynote of his system: "In religion there is no Hindu, and there is no Moslem." Many miracles are credited to him. The eclectic character of his system made Nanak acceptable to Hindus and Moslems alike.

In Benares he succeeded in converting many Hindus, and not a few Moslems, among the latter the Sheik Farid, afterwards a valuable assistant in enabling Nanak to combine in his religious system the ideas of the Hindu and of the Moslem. He is said to have visited Mecca, and to have acknowledged Mohammed as a God-sent messenger. He died after having named Angad as his successor, the *guru* or teacher of the Sikhs. Nanak was an uneducated man, but a book was compiled by one of his successors (Arjun, the fifth *guru*), which claims to record the opinions and teachings of Nanak. This sacred book, the "Adi Granth," is guarded and preserved with great honor in the Golden Temple of Amritsar. It is called by the people the "Granth Sahib."

Sikhism is a pantheistic system, similar to Hinduism, but rejecting caste distinctions and idolatry. It contains the mystic elements of ancient Hinduism, and the more modern teachings of the Moslem Sufis. Govind Singh (1708) welded the Sikhs into a military power. He established the Khālsa, or brotherhood, by which he enrolled the followers of Nanak into an army of fighting men, and conferred upon each member the title of Singh, or lion. After a turbulent reign he was slain by an Afghan follower, and in his dying moments refused to name a successor. He said the "Granth Sahib" was enough to guide them for all time. The Sikhs were little heard of after Govind's death, but the falling power of the moguls, and the invasion of India, first by Nadir Shah and then by Ahmad Shah, the Afghan, favored their revival as a military power. In 1763 40,000 Sikhs defeated the Afghan governor of Delhi. In 1785 the Sikhs formed a confederacy, with annual durbars at Amritsar, and numbered more than 70,000 horsemen. Under the rule of Runjeet Singh they became an important nation. After his death the Punjab was ruled by a durbar, or council, of Sikh nobles, during the minority of Runjeet Singh's son, Maharajah Dhuleep Singh. Eventually Dhuleep Singh abdicated in favor of the British. He died in Paris in 1894. The Sikhs are admirable soldiers, and there are about 14,000 serving under British colors. They remained loyal during the mutiny. Among the leading Sikh princes are the maharajahs of the semi-independent states of Patiala, Kashmir, and Kapurthala.

Sik'kim, feudatory state of British India, on the S. slope of the Himalayas, with Tibet on the E. and N., Nepal on the W., and Darjiling on the S. It is about 70 m. long N. and S., and 50 m. broad. Area, 2,818 sq. m. It is governed by a maharajah, aided by a British political resident, who by treaty with China in 1890 has entire charge of the foreign affairs. It is a mountainous, elevated, and healthful territory, producing rice, maize, millet, tea, oranges, cloths, and copper. Pop. (1901) 59,014. The people are Buddhist. The principal towns are Tumlong and Gamtak.

Si'lage. See ENSILAGE.

Sile'nus, in mythology, son of Hermes or Pan, and the instructor and companion of Dionysus. In Asia Minor he was the god of flowing water, and so carried a skin of water; but in Greece he was degraded to a mere daimon, and was represented as a drunken, jolly, fat old fellow with bald head, flat nose, and abundant hair all over his body, and carrying a skin filled with wine.

Sile'sia, province of the former Prussia, S. of Brandenburg; bounded E. by Poland, S. by Moravia and Bohemia, and W. by Saxony. Area, 15,569 sq. m. Along the S. and W. it is mountainous, but the central part is flat, traversed by the Oder and its tributaries. The soil is fertile. Grain, flax, hemp, oil plants, tobacco, beets, and hops are cultivated. An excellent breed of sheep yields a very fine wool, and manufactures of linens and woolens are carried on. Lead, copper, and coal are abundant. Pop. (1910) 5,225,962. Capital, Breslau.

Silesia was from the sixth century inhabited partly by German, partly by Slavonic tribes, and formed several fiefs, first of the Polish, then of the Bohemian crown. In 1537 the Duke of Liegnitz and the Elector of Brandenburg agreed that if either of the two reigning lines became extinct its possessions should fall to the other. In 1675 the ducal family died out, but the German emperor incorporated Liegnitz into the Austrian Empire. Under Prussia Silesia developed greatly, and became one of the richest provinces. In the peace treaty of 1919 Germany ceded to Poland the SE. tip of Silesia beyond and including Oppela and the most of Posen.

Silesia, Aus'trian, province of Austria, between Prussia, Moravia, and Galicia. Area, 1,987 sq. m. The N. part is covered by the Sudetic Mountains; the rest is flat, though high. The climate is rigorous, but healthful. Good crops of rye, barley, and oats are raised, cattle, sheep, and bees are extensively reared, and copper, lead, iron, and coal are mined. Pop. (1910) 756,949, of whom four fifths are Roman Catholic. Capital, Troppau.

Silhouette' (from Étienne de Silhouette, French Minister of Finance in 1759, either because of his excessive economy, causing his name to be applied to things cheap, or because of his making such figures as a diversion), a figure drawn in outline and filled in solid, usually with black, without other details than those of the outline; much like a shadow. By extension the term is used when there is some slight delineation of the parts within the bounding line.

Sil'ica, or **Silic'ic Ac'id,** a compound (SiO_2) of silicon with oxygen. It occurs in nature partly free, partly in combination in the silicates. Free silica is either crystallized or amorphous. The crystallized varieties contain no water, and are insoluble or difficultly soluble in alkalies. The amorphous varieties contain water, and are dissolved by alkalies. The principal form in which silica occurs is quartz. Tridymite constitutes an allotropic form of silica. All amorphous varieties of mineral silica are called opal. Among these are opal and hyalite. Mixtures of the crystallized and amorphous varieties of silica also occur in nature. Among these are agate, flint, carnelian, chalcedony, and chert.

The relations of silica to life upon the land are important. Of the animal kingdom it is but a very trifling constituent, but to many plants silica has the same relation that tricalcic phosphate has to animals—that is, silica is the main material of the plant skeleton. Of the ashes of plant stems, particularly, silica is often found to be a large constituent; thus in ash of rye-straw is found sixty-five per cent, of potato stems thirty-six per cent, and of wheat-straw as much as seventy-three per cent. Hence the importance of the existence in soils of silica in such form that it may pass in solution into the roots—namely, in the form of soluble silica, or more probably that of hydrated silica.

Sil'icate Cot'ton. See MINERAL WOOL.

Sil'icide of Car'bon, or Carborun'dum, a compound of the formula SiC. Its most important characteristic, industrially, is its hardness, which is between that of the sapphire, which it scratches, and the diamond. It is used as a substitute for emery or corundum, and is made into wheels, whetstones, and polishing cloths. It is made by exposing a mixture of sand and carbon to the heat of a strong electric current for eight hours. The result is a mass of small crystals, which is crushed and the powder digested with dilute vitriol to remove impurities.

Sil'icon, an element which, next to oxygen, is the most abundant in the earth's crust. Quartz, sandstones, and other forms of silica contain over forty-five per cent of silicon. Granite and gneiss rocks average thirty-five, slates thirty, and trap rocks twenty-three per cent. Silicon was first obtained by Berzelius in 1823 from the silicofluoride of potassium by the action of fused potassium. It is an amorphous powder of dull-brown color, which smears the fingers like lampblack. It does not conduct electricity; is not acted on by mineral acids, except hydrofluoric, but dissolved by potash solution. Heated in air or oxygen, it burns brilliantly, forming silica, SiO_2. The allotropic forms of silicon show a remarkable parallelism with those of carbon; and there are no elements of such dissimilar functions in nature which present so many analogies as carbon and silicon, the first being a characteristic element of the organic kingdom and the last of the inorganic. Silicon is a more powerful agent in smelting reduction than carbon, and if it were cheaply procurable would have valuable practical applications. Silicon combines with iron at high temperatures, and pig irons often contain it.

Sil'ius Ital'icus, 25–101 A.D.; Roman poet; full name TIBERIUS CATIUS SILIUS ITALICUS; acquired some reputation as a pleader. Possessed of ample means, he devoted himself to literature and philosophy. Among his friends were the Stoics Epictetus and Cornutus, and he ended his life in Stoic fashion by voluntary starvation, being afflicted with an incurable disease. His epic poem, "Punica," in seventeen books, is the longest of the Roman epics, and also the dullest, evincing more industry than talent.

Silk, a fine, soft, strong, elastic, and lustrous filament or fiber produced by the larvæ of certain moths which feed on the leaves of the mulberry (*Morus alba*) and other trees, and are known as silkworms. The finest silk is the product of the *Bombyx mori* or silkworm, which feeds on the mulberry. Tussah silk, produced by the oak-feeding worm, is woven in India and China into a cloth of primitive make, and is finding a more extended consumption in Europe. Such is the fineness of the thread that several of them have to be reeled together. This fineness varies, even in the same cocoon, and reaches as low as $\frac{1}{700}$th in. in diameter, while the length of the worm's secretion, compared with its weight, exceeds 1,000,000 yds. to the pound. The secretion which the full-grown silkworm emits comes

through two tubes which combine in the worm's "spinner" under its lower lip. The cocoon is formed in six or eight days, and in three weeks the worm undergoes all the transformations into chrysalis and butterfly. The best cocoons are retained for seed—for the hatching of moths which are to lay eggs. The chrysalides in the other cocoons have to be killed, usually in a hot-air oven, to prevent the piercing of the cocoon, which would make it unfit for reeling.

Before reeling the cocoons are cleaned by removing the frame which the worm builds before lining it, and which is the floss or loose silk. The reeling has to be done carefully, usually by female labor. The gummy substance which makes the cocoon a homogeneous mass has to be softened to permit of free unwinding of the thread. So reeling is done while the cocoons float in hot water, the spinner touching them lightly with a small broom to find the ends that have to be spun together. From two to six cocoons or more are reeled together. Attached to these threads is sufficient of the gum to cause them to be glued together with a slight pressure and a light twist. The combined thread is then carried on to the reel. The thread produced by reeling is *raw silk*, and comes in skeins or hanks. Waste silk, including pierced cocoons, etc., is made into yarn called spun silk, which is used as a filling, and in mixed goods as well as in velvets and plushes. The brilliancy of silk is increased by "boiling off" the gum. This reduces the weight; but the loss is recouped by dyeing. Indeed, by "loading" the fiber with dye and other substances, its weight may be increased fivefold, but the fiber is weakened. Unloaded silk is known as pure dye.

When one color is used for the warp and another for the filling in a plain tissue, the two colors combine, producing an effect of reflex, known as changeable (French, *glacé*). Another effect that can be produced on silk fabrics, and which is called *moiré*, is obtained by exerting pressure on a grained silk fabric (gros-grain) which becomes flattened at certain spots, producing a design. Satin has a smooth surface, formed by well-twisted warp threads. Taffeta is relatively light tissue, plainly woven. Pongee is still lighter, and was first imported from China; it is woven in the U. S. and Europe in varieties, known under different names. The Japanese export much light silk fabrics, known as habutai and kaiki. Grained surfaces are represented by gros-grain and other tissues. A good gros-grain has to be carefully woven to insure regularity of the grain. Surah represents the twilled weaves. Ribbed fabrics are plentiful in silk goods, and are known under various names according to the thickness of the ribs. Tulle, gauze, grenadine, and veil are transparent fabrics, the weaving of which requires care, and the threads for which have to be specially thrown, as some of these require thread more twisted than is the case with other goods. The cheaper satins are made of silk and cotton, and are known as cotton-back satins (the silk showing on the satin face, the cotton on the back) to distinguish them from the all-silk satins.

The production of raw silk of the world is estimated at about 53,000,000 lb. per annum. Of this China and Japan supply more than one half, Italy produces one sixth, and France much less. Sericulture in the U. S. has not been successful, probably on account of the lack of the necessary cheap but careful labor required. Conditioning silk means to determine the amount of moisture it contains, and the expression of its fineness by a number indicating its weight for a certain length. The principal silk-manufacturing countries are France, with a product of $100,000,000 per annum, and the U. S., with a product of $90,000,000 per annum. Switzerland and Germany follow with products exceeding $20,000,000. Great Britain has an important silk industry, which, however, has made little progress since 1860. It is the largest importer of silk goods, purchasing over $60,000,000 yearly, and exporting only a small amount. With its large home production, the U. S. is now the largest consumer of manufactured silks.

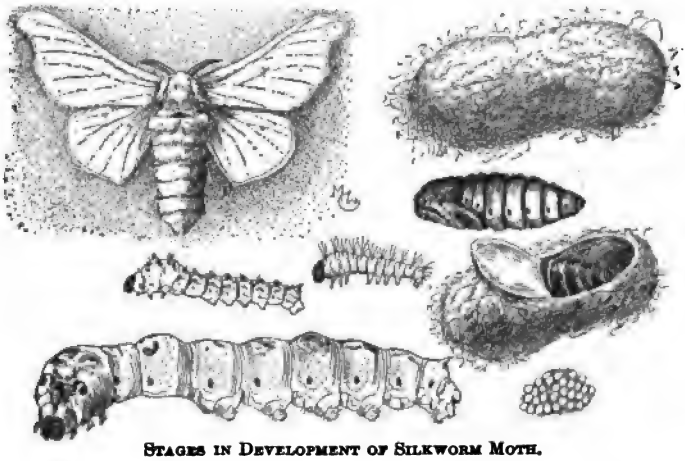
The Chinese records agree that Hwang-Ti, Emperor of China between 2700 and 1700 B.C., charged his queen, Si-Ling-Chi, to test the practicability of using the thread from the cocoons. She discovered not only the means of rearing silkworms, but the method of reeling silk and of employing it to make garments. The Chinese kept their methods of rearing silkworms and reeling silk a secret for nearly two thousand years. Aristotle was the first European to learn the true origin of the wrought silk brought to him from Persia on the return of the army of Alexander. He described the silkworm as a horned insect, passing through successive transformations, and producing *bombykia*, the name he gave to the silk. Two Nestorian monks arrived at Byzantium from China, bringing with them the seeds of the mulberry, and communicated to Justinian their discovery. The exportation of the eggs or of unreeled cocoons from China was forbidden under the pain of death; but, stimulated by the liberal promises of Justinian, the monks returned to China, and in 555 came back, bringing silkworm eggs concealed in the hollows of their pilgrims' staves. From this beginning the culture of silk spread rapidly over Greece and Syria.

James I, in 1622, sent eggs, white mulberry trees, and printed instructions to Virginia, but sericulture could not equal the profits of tobacco growing. After the Revolution very little silk was produced in the U. S., although in Connecticut a good supply was raised for local needs. In 1840 some machinery was taken from Connecticut to Paterson, and gave rise to an industry that has been steadily growing and has caused Paterson to be called the Lyons of America. In the U. S. nearly everything in the line of silk manufactures can be produced, although foreign goods find a market either on account of their novelty or because the lower wages paid in other countries enable foreign makers to sell some goods cheaper than they can be produced in the U. S., notwithstanding the import duty. In 1906, the value of the products of silk manufactures was $133,288,072.

Silk, Artifi'cial. In 1888 a preparation of pure cellulose run through a fine funnel was found to form a filament almost as fine as silk. It was brilliant, and dyed easily, but was inflammable. Improvements were introduced, and now (1908) about seven tons of artificial silk are produced daily. It is pure cellulose, with a silken luster obtained from gun cotton, from cellulose dissolved in copper ammonia or zinc chloride, or by the decomposition of sulphocarbonate of cellulose. These imitations have only half the strength of real silk; but whereas silk sells at $7 to $10 a pound, the imitations cost only from 70 cents to $4 a pound. See SILK.

Silk, Veg'etable. See PULU FIBER.

Silk'worm, the silk-producing larva of a bombycid moth. The silkworm proper, *Bombyx mori*, feeds upon the mulberry, and was derived from the N. of China, though the wild worm has not been rediscovered. The moth is white. The caterpillar is hairy when hatched, with a large head. When fully fed it is naked, not very thick-bodied, cylindrical, and with a horn on the tail. It is 3½ in. long, and of an ashy or cream color. The silkworm is an annual, though some allied species yield two or three broods in India. It moults four times. The eggs are about the size of mustard seeds, and the larvæ of the first age are one or two lines long, and of a dark color. In five days begins the second stage. In the third stage the worm is naked, whitish, and lives six days before attaining the fourth. The fifth stage is the longest, lasting nine days; and at this time the worm is very voracious. It then ceases to eat, and in about thirty-six days after hatching it makes its cocoon, which is spun from the large silk glands opening in the under lip.



STAGES IN DEVELOPMENT OF SILKWORM MOTH.

In the rearing of the silkworm the room should be well ventilated and warmed, with racks containing frames from 1 to 1½ yds. in breadth, with a border to prevent the worms from falling, and lined with paper. The eggs laid before the end of winter are hung up in woolen cloths in a cool, dry place exposed to the N. As soon as the buds of the mulberry tree begin to unfold the eggs are spread in very thin layers, placed for three or four days in a room having a S. aspect, but out of the rays of the sun. The temperature is gradually raised to 25° C., and maintained till all are hatched. The larvæ are fed six to eight times a day on chopped leaves. The worms are removed to new food by nets placed upon the old food, the worms ascending through the meshes to the fresh leaves. When fully fed they ascend into sprigs of heather placed at intervals on the tables. Here they spin their cocoons, some of which are white, producing the best silk, while most of them are yellow.

The tussah moth (*Antheræa mylitta*) has a closed cocoon, spun from an unbroken thread. It is semidomesticated in India, and the silk is hard, durable, and of a dark-brownish color. The yama-mai (*A. yama-mai*) of Japan does well in France in the open air.

The ailantus silkworm can be reared in Europe and the U. S., and is double-brooded. Though the cocoon is open at one end, the thread with care can be unwound; in one case an unbroken thread 800 yds. long was unreeled. The silk, like that of the tussah moth, is coarse, ill-colored, and inferior to mulberry silk. A similar article is furnished by the American silkworm (*Telea polyphemus*). The thread is coarser than that of the *Bombyx mori*, but has a rich gloss, and can be used in commerce. The thread can be readily unwound. Its larva feeds on the oak. See AILANTUS SILKWORM.

Sil'liman, Benjamin, 1779–1864; American scientist; b. N. Stratford (now Trumbull), Conn. Graduated at Yale; admitted to the bar 1802, and in the same year chosen Prof. of Chemistry in Yale; spent a part of 1802–4 at Philadelphia, preparing for his professorship, and later studied in England, Scotland, and Holland. He made a geological survey of a part of Connecticut, the first of the kind in America. With the compound blowpipe he demonstrated the fusibility of several bodies never before fused; founded in 1818, and directed till 1846, *The American Journal of Science and Arts*, known as *Silliman's Journal*. He recorded the effect of a powerful battery in volatizing carbon; was an eloquent scientific lecturer before popular audiences, having been perhaps the first to give such courses in the U. S. His son BENJAMIN (1816–85) was also a popular lecturer on scientific topics.

Si'lo. See ENSILAGE.

Silo'am, a fountain and pool in Jerusalem, on the S. edge of Ophel, 1,708 ft. SSW. of the Fountain of the Virgin, with which it is connected by a winding tunnel. The fountain

proper, hewn out of solid rock, is 6 ft. wide. Like the Fountain of the Virgin, it is intermittent. The lower basin is 52 ft. long, 18 broad, and 19 deep, but now holding only 3 or 4 ft. of water. It was once arched over. Jewish writers say it furnished the water used in sacrifice on the last great day of the Feast of Tabernacles. Jesus alludes to the sending a Levite with a golden pitcher to get it (John vii, 37–39). This pool is mentioned three times in the Bible (Isa. viii, 6; Neh. iii, 15; John ix, 7), but frequently by Josephus. In the tunnel, cut in the solid rock, there was discovered in 1880 a Hebrew inscription, which reads: "Behold the piercing through! And this was the manner of the piercing through: Whilst yet the miners were lifting up the pick, each toward his fellow, and whilst yet there were 3 cubits to be cut through, there was heard the voice of each calling to his fellow, for there was a fissure in the rock on the right hand. And on the day of the piercing thus the miners smote each so as to meet his fellow, pick against pick; and there flowed the water from the source to the pool, 1,200 cubits, and 100 cubits was the height of the rock over the head of the miners." The inscription is undated, but is at least from Hezekiah's time, and is one of the oldest Hebrew inscriptions. 2 Kings xx, 20, and 2 Chronicles xxxii, 30, may allude to the excavation. In 1889 a second conduit, 20 ft. below the ground, was discovered leading from the Pool of Siloam to another reservoir which once existed below. To it Isaiah viii, 6 is supposed to refer. It was to Siloam that Jesus sent the blind man (Luke iv, 18).

SILOAM is also the name of a little straggling, dirty village occupying an old quarry on the east side of the Kedron, overlooking the Pool of Siloam.

Sil'phium, genus of perennial plants of the *Compositæ*, comprising twenty species, many of which are found in abundance in the U. S. on the prairies and in the S. states. They are hardy and coarse, bear large flower heads, and exude a resinlike juice, whence the commonest species (*Silphium laciniatum*) has received the name of rosin weed. The stem sometimes exceeds 10 ft. in height. The resin and the leaves are employed by farriers for asthma in horses. This species is known as the compass plant, pilot weed, and polar plant, from the fact that its leaves have a tendency to stand with one surface facing the E. and the other the W.; the plane of the leaf, which is usually vertical, is thus N. and S. The prairie burdock (*S. terebinthinaceum*) and the cup plant (*S. perfoliatum*) belong to this genus.

COMPASS PLANT.

Silu'rian Pe'riod, the division of geologic time preceded by the Cambrian period and followed by the Devonian. The name was first applied to rocks occurring in England and Wales in a district formerly occupied by the Silures. The lower Silurian strata have sometimes been called the Ordovician. The Silurian rocks of the U. S. are well developed in the basin of Lake Ontario and in the Champlain-Hudson valley, extending thence SW. along the Appalachians through Pennsylvania, Maryland, Virginia, Tennessee, and Georgia into Alabama. In New England are several outlying areas, in which the rocks are metamorphic. In Ohio, Indiana, Kentucky, and Tennessee are broad areas laid bare by the erosion of the crest of the Cincinnati arch, and a still greater area follows the W. coast of Lake Michigan and sends an arm up the Mississippi valley into Minnesota. Other areas are found in Missouri and Texas. The hydraulic cement and salt of New York and the fossil iron ores of the Appalachian chain from New York to Alabama, besides sandstones and limestones of architectural importance, are derived from formations of this period.

Silu'ridæ, large family of fishes of the order *Nematognathi*, comprising the catfishes of Europe and N. America.

Sil'va, Antonio José da, 1705–39; Portuguese dramatist; b. Rio de Janeiro, Brazil; became a lawyer in Lisbon. He soon became known as the author of numerous comedies, which are regarded as among the finest in Portuguese. Silva's mother, of Jewish descent, was accused of Judaism, and imprisoned by the Inquisition; later, suspicion fell on the poet and his wife, they were twice incarcerated, and finally all three were burned at Lisbon, October 13, 1739.

Sil'ver, a precious metal known from remote ages, and much used for ornaments and for money. Among the alchemists it was known as *luna*. Its symbol, Ag, is derived from the Latin name *argentum*. It is the whitest of the metals, and takes a brilliant polish. In hardness it is intermediate between gold and copper, and it is very malleable and ductile. It may be beaten into leaves 0.00001 of an inch thick. A grain may be drawn into a wire 400 ft. in length. The specific gravity of silver ranges from 10.1 to 11.1. The metal fuses readily on charcoal before the blowpipe or in a crucible in a forge or furnace. It expands upon cooling, and thus solid pieces will float in molten silver. It may be vaporized by strong heat; the vapors are white. When pure the molten metal absorbs from twenty to twenty-two times its bulk of oxygen. The absorbed gas is given off upon solidification, with considerable force. This mechanical projection of a portion of a globule of silver cooling upon a cupel is a frequent source of loss in assaying. Absorption of oxygen is also prevented by fusing it under a layer of salt. Silver is a good conductor of heat and of electricity. It is capable of being welded, alloys freely with gold, copper, and several other metals, and crystallizes.

Silver is abundantly distributed in nature, particularly among the metallic minerals. It exists in sea water in the ratio of 1 milligram to 100 kilograms, so that the oceans contain not less than 2,000,000 tons of silver. All native gold contains from .016 to sixteen per cent of silver, but generally from five to thirteen per cent; California gold averages about twelve per cent of silver. It occurs also nearly pure in masses and irregular grains, but it is not so generally distributed in this form as gold, and is seldom found in placers or alluvial deposits, being confined rather to the vicinity of the outcrops of veins. It is usually in irregular, ragged masses, or in thin sheets coating surfaces of the veinstone, or filiform, as if drawn out into wire. At Kongsberg, in Norway, the metal has been found massive and in large and perfect crystals, which retain their whiteness without tarnishing. One mass weighs over 500 lb. Large amounts of native silver have been obtained in Mexico and S. America. One mass in Peru is said to have weighed 800 lb.

Some specimens are remarkable for being completely joined to copper, without any intermingling of the metals; half of a mass may be silver and the other half copper. The native alloy in the great Comstock lode of Nevada contains about forty-three per cent of silver, the rest being gold. Of the $550,000,000 produced from the lode, $250,000,000, or a little less than half, was gold. The chief ores are the sulphide, containing eighty-six per cent of silver; the brittle or antimonial sulphide, with 68.5 per cent of silver; gray silver ore, with twenty-three per cent of silver; dark-red silver ore, with sixty per cent; and the light-red silver ore, with sixty-four per cent. This last is generally known as ruby silver, from the brilliant ruby red of the crystals by transmitted light. In the upper portions of silver-bearing veins, where air and moisture have had access, there are generally oxides, chlorides, bromides, and iodides, more earthy and highly colored than the deeper parts of the vein. They are also softer than the unchanged ores below, and are more easy to work. A large class of the metallic minerals contain silver in varying proportions, especially galena and blende, which are rarely free from a portion of silver. Lead containing only 3 oz. of silver to the ton can now be worked with profit, and in smelting operations on a large scale where lead ores are used as a flux even a small amount of silver is important.

The antiquity of silver coinage is great. The most ancient coins known were struck in silver by Phidon, King of Ægina, 869 B.C. After the conquest of Egypt by Cambyses, abt. 540 B.C., a great improvement appears to have been made in the purification of silver, for that which was produced under Aryandes was celebrated for its purity and fineness. The Athenian currency was noted for its purity, and Xenophon mentions the profit with which it could be exported. Silver currency was adopted by the Roman republic abt. 269 B.C., and its standard was as high as the Greek, but it rapidly fell. Under Vespasian the alloy was one eighth, under the Antonines one fourth, under Severus about one half, after which there does not appear to have been a fixed standard. After the loss of Spain, from which the chief supply of silver was drawn, the silver currency vanished, and was replaced by *billon* denarii, having only one fourth part of silver. The denarii of Justinian and the Italian Goths weigh about 15 gr. troy, and are the antecedents of the Anglo-Saxon silver penny.

Silver was used by the Romans for household plate and table decoration. It was chased and embossed by Grecian artists. The Romans vied with one another in possessing the most massive dishes. Pliny cites the existence of one dish weighing 500 lb. The old chased plate of the Grecian artists was valued as a curiosity in Pliny's time. The ornamentation of silver, known as niello work, originated in Egypt, and was revived to great perfection in Florence. This art was applied to the decoration of armor as early as the days of Homer. In mediæval times massive plate was in favor, and the chief form of investment for the noble born and wealthy. The annual consumption of silver in the industrial arts approximates $197,000,000 coining value, and is increasing.

Solid silverware has been to a great extent replaced by nickeliferous alloys and britannia ware, covered with pure silver by the galvanoplastic method. Silver may thus be deposited to any desired thickness, thus giving all the appearance of solid silver, and its utility for most purposes. In the U. S. and in France the standard fineness is one tenth of alloy, the mixture being denominated .900 fine. In Great Britain the standard is 925 of silver and 75 of copper, or .925 fine. This is "sterling silverware."

The value of silver relatively to other objects obviously depends upon two chief conditions—the demand and the supply. The demand is seriously affected by legislation, as, for example, the demonetization of silver. The supply is also variable, and at times excessive. The production of silver in the large way, owing to its mode of occurrence and mineralization, is more dependent upon the use of mechanical power (steam or water) than upon the labor of men, and generally it requires a heavy plant and large capital. There may therefore be a large production of silver in sparsely populated regions and within a short period of time. With gold, however, the bulk of the product is derived from placers. It is so much more generally distributed in the earth that an unlimited number of men may be engaged together in its production. No expensive preparations or chemical operations are required to obtain gold in a merchantable form.

The value of silver relatively to gold has greatly changed within historic times, and it has been different in various countries. In the ancient world silver was the peculiar production of Europe as gold was of Asia, and the estimation of silver relatively to gold was higher in Asia than in Europe—a condition prevailing until within a recent period. Newton, in 1717, showed that the ratio in weight of equal values of silver and gold, in China

and Japan, was as 9:1, while it was as 15:1 in Europe. Perhaps the earliest recorded ratio is found inscribed at Karnak, the tribute lists of Thutmosis (1600 B.C.) giving 13.33:1. The same ratio is shown by cuneiform inscriptions on plates found in the foundations of Khorsabad and on ancient Persian coins. It was reported by Xenophon (400 B.C.) as the ratio in Asia. Toward the Christian era gold fell in value relatively to silver. As early as 189 B.C. the Romans coincided with the Greeks in estimating the value of gold compared with silver as 10:1. Upon Cæsar's return to Rome gold became so abundant that the ratio for a time was as 7½:1. A century later the ratio was as 12½:1, where it remained for one hundred and fifty years. When guineas were first coined in 1663 the value of fine gold compared with that of fine silver was rated in the English mint at about 14:1. In 1805 the ratio was nearly as 15:1, and in other countries gold was rated higher. In the Middle Ages the ratio varied from 9:1 to 12.8:1. At the discovery of America the ratio was 11.30:1, since which, up to the discovery of gold in California and Australia, it gradually rose to 15.83:1 in the year 1850. In 1870 and 1871 the average commercial ratio was 15.57:1, and in 1873 as 15.92:1, with a gradual increase to 26.49:1 in 1893, 32.56:1 in 1894, and 34.36:1 in 1899. The world's production of silver for the year 1910 was estimated at 222,879,362 oz. fine, with a coining value of $288,167,300.

PRODUCTION OF GOLD AND SILVER IN THE WORLD SINCE THE DISCOVERY OF AMERICA.

From 1493 to 1885, from a table of averages compiled by Dr. Adolph Soetbeer; since the latter date, the estimates of the Director of the Mint.

Period.	Gold. (Total for Period.)		Silver. (Total for Period.)		Percentage of Production, By Weight.	
	Ounces, Fine.	Value.	Ounces, Fine.	Coining Value.	Gold.	Silver.
1493–1520	5,221,160	$107,931,000	42,309,400	$54,703,000	11.0	89.0
1521–1544	5,524,656	114,205,000	69,598,320	89,986,000	7.4	92.6
1545–1560	4,377,544	90,492,000	160,287,040	207,240,000	2.7	97.3
1561–1580	4,398,120	90,917,000	192,578,500	248,990,000	2.2	97.8
1581–1600	4,745,340	98,095,000	269,352,700	348,254,000	1.7	98.3
1601–1620	5,478,360	113,248,000	271,924,700	351,579,000	2.0	98.0
1621–1640	5,336,900	110,324,000	253,084,800	327,221,000	2.1	97.9
1641–1660	5,639,110	116,571,000	235,530,900	304,525,000	2.3	97.7
1661–1680	5,954,180	123,084,000	216,691,000	280,166,000	2.7	97.3
1681–1700	6,921,895	143,088,000	219,841,700	284,240,000	3.1	96.9
1701–1720	8,243,260	170,403,000	228,650,800	295,629,000	3.5	96.5
1721–1740	12,268,440	253,611,000	277,261,600	358,480,000	3.2	95.8
1741–1760	15,824,230	327,116,000	342,812,235	443,232,000	4.4	95.6
1761–1780	13,313,315	275,211,000	419,711,820	542,658,000	3.1	96.9
1781–1800	11,438,970	236,464,000	565,235,580	730,810,000	2.0	98.0
1801–1810	5,715,627	118,152,000	287,469,225	371,677,000	1.9	98.1
1811–1820	3,679,568	76,063,000	173,857,555	224,786,000	2.1	97.9
1821–1830	4,570,444	94,479,000	148,070,040	191,444,000	3.0	97.0
1831–1840	6,522,913	134,841,000	191,758,675	247,930,000	3.3	96.7
1841–1850	17,605,018	363,928,000	250,903,422	324,400,000	6.6	93.4
1851–1855	32,051,621	662,566,000	142,442,986	184,169,000	8.4	81.6
1856–1860	32,431,312	670,415,000	145,477,142	188,092,000	18.2	81.8
1861–1865	29,747,913	614,944,000	177,009,862	228,861,000	14.4	85.6
1866–1870	31,350,430	648,071,000	215,257,914	278,313,000	12.7	87.3
1871–1875	27,955,068	577,883,000	316,585,069	409,322,000	8.1	91.9
1876–1880	27,715,550	572,931,000	393,878,009	509,256,000	6.6	93.4
1881–1885	23,973,773	495,582,000	460,019,722	594,773,000	5.0	95.0
1886–1890	27,306,411	564,474,000	544,557,155	704,074,000	4.8	95.2
1891–1895	39,412,823	814,736,000	787,906,656	1,018,708,000	4.8	95.2
1896–1900	62,234,698	1,286,505,400	828,466,522	1,071,148,400	7.0	93.0
1901–1905	77,898,731	1,610,309,700	825,140,458	1,066,848,300	8.7	91.3
1906–1910	104,836,184	2,166,796,100	985,725,678	1,274,473,600	9.6	90.4
Total	669,828,483	$13,846,225,600	10,654,233,769	$13,775,170,900	5.9	94.1

Silver forms many compounds of scientific and technical interest: *Silver chloride*, AgCl, is found native as horn silver. The insolubility of silver chloride causes its production, by adding a solution of a chloride, to be a delicate test of the presence of silver. The volumetric method of silver assay, in use in U. S. mints, depends on the use of a standard solution of common salt to precipitate the silver as chloride. Silver chloride melts at about 500° F. to a clear liquid. On exposure to light and moisture it becomes darker. When any organic matter is present, as when the chloride is applied to paper, this action of light is far more powerful. Photographic methods are chiefly founded upon these kinds of changes of the halogen compounds of silver by light, the dark compound formed under the influence of the light being insoluble in hyposulphite of soda and other fixing agents, while the unchanged chloride, iodide, or bromide of silver remains soluble, and is easily removed from the paper, leaving the picture, composed of the dark-colored compound, *Silver bromide*, AgBr, constitutes the mineral bromyrite or bromargyrite. It is found in Mexico and Chili, and in Brittany. *Silver iodide*, AgI, forms iodyrite, found in Mexico, Chili, Spain, and Arizona. It is sulphur yellow when pure, and very soft and sectile. Bromide and iodide of silver, when precipitated, are much more sensitive to light than the chloride.

Silver nitrate, $AgNO_3$, known also as *lunar*

caustic, has important applications in medicine and in photography and electroplating. It crystallizes easily, and is largely introduced into commerce in crystalline form, though medicinal lunar caustic is fused and cast into sticks. It is soluble in its own weight of cold water.

Silver sulphide, Ag_2S, constitutes argentite or silver glance. It contains, when pure, eighty-seven per cent of silver, being the richest of all silver ores. It is common in the Comstock lode, as well as in many other localities in the U. S., and forms compounds with other metallic sulphides.

Silver Coin'age in the Unit'ed States. The question whether it is the wiser policy of the U. S. Govt. to admit the coinage of silver in unlimited quantities at the established ratio with gold, or to restrict the minting of the cheaper metal, has constituted an important issue in party politics. See COINAGE; MONETARY STANDARDS.

Silver Plat'ing. See ELECTRO PLATING.

Simbirsk', government of European Russia; on the Volga; area, 19,110 sq. m. The surface is level and the soil fertile. Agriculture, breeding of cattle and horses, fisheries, and manufactures of coarse woolens and linens are the principal industries. Rye, wheat, buckwheat, hemp, flax, and tobacco are the common crops. Pop. (1902) 1,820,100.

Sim'eon, the second son of Jacob and Leah (Gen. xxix, 33). He was cursed by the dying Jacob, and Moses passed by the tribe in silence (Deut. xxxiii). The tribe of Simeon numbered 59,300 at the Exodus, but only 22,200 at the entrance into Canaan (Num. i, 23; cf. xxvi, 14). Its territory was scattered, comprising districts wholly within the territory of the tribe of Judah, and tracts in Mt. Seir and Gedor. The tribe sank into obscurity.

Simeon Styli'tes, abt. 390–459; pillar saint; a Syrian who spent several years in convents, but not being satisfied with the severity of their discipline, lived austerely in a hut on Mt. Telanissa, and, to escape contact with visitors attracted by his holiness, lived on the top of a pillar, at first 10 ft., but gradually increased till it was 60 ft. high. On the top of this he lived for thirty years. He had many imitators.

Simfero'pol, or **Simpheropol**, town of Russia, in the Crimea; capital of the government of Taurida; beautifully situated on the Salghir, in a picturesque valley surrounded with gardens and orchards. Pop. (1907) est. at 49,078.

Simi'idæ, a family of mammals of the *Primates*, suborder *Anthropoidea*, containing the mammals most closely related to man. The form is considerably like that of man, but the anterior limbs are very elongate and the posterior relatively short; they have no tails, and by many anatomical characters the species are approximated to man. To this group belong two types—one of large, robust species, *i.e.*, the chimpanzee, gorilla, and orang-outang, the subfamily *Simiinæ*, and the other comparatively small, slender species, *i.e.*, the gibbons, or subfamily *Hylobatinæ*. The *Simiidæ* are peculiar to the Old World (the monkeys of the New World belonging to two different families —the *Cebidæ* and *Mididæ*), and are confined to tropical Africa and Asia.

Simile (sĭm'ĭ-lē), a figure of speech by which anything, in one or more of its aspects, is likened to something else; an imaginative or poetical comparison, pointed out by use of such words as *like* or *as*; *e.g.*, "*Like* as a father pitieth his children, *so* the Lord pitieth them that fear him."

Sim'la, district and town in the Punjab, British India; on the S. slopes of the Himalayas; area of district, 18 sq. m.; pop. 45,000. The town is the permanent abode of many Europeans, and during the summer the headquarters of the government of British India, and the temporary home of Europeans from every part of British India. The annual mean temperature is 57.8°. Pop. (of town) abt. 15,000.

Simms, William Gilmore, 1806–70; American novelist; b. Charleston, S. C.; admitted to the bar 1827, but abandoned that profession for literature and journalism; wrote at Hingham, Mass., his longest and best poem, "Atalantis, a Story of the Sea," and his earliest novel, "Martin Faber, the Story of a Criminal"; returned to S. Carolina and wrote a series of romances founded on Revolutionary incidents in S. Carolina, including the "Partisan"; romances of colonial life, of which "The Yemassee" is the best; published two volumes of "Views and Reviews in American History, Literature, and Fiction" (1845–46), a "History of South Carolina," and "South Carolina in the Revolution." He was a member of the S. Carolina Legislature.

Simon (sē-mōn'), **Jules François Suisse**, 1814–96; French statesman and political writer; b. Lorient, France; succeeded Cousin as Prof. of Philosophy at the Sorbonne, 1839, but dismissed, 1851, for opposing the *coup d'état*; member of the Legislative Assembly for the department of Loire in 1863; opposed the policy of Napoleon III, the plebiscite of 1870, the declaration of war against Prussia, etc., and was a member of the government for the national defense and of the government of Thiers, as Minister of Public Education. He effected important reforms, but provoked the hostility of the clericals by his efforts to establish compulsory education. In 1876 he became premier, but difficulties with the president caused his resignation, 1877; senator for life, and member of the French Academy, 1875. His writings are distinguished by clearness and precision, and some are the result of very comprehensive studies. Among them are "Histoire de l'École d'Alexandrie," "La Devoir," "La Religion naturelle," "La Liberté," "L'Ouvrière," "Le Travail," "La Politique radicale," "Le Libre échange," "Souvenirs du 4 Septembre," "Dieu, Patrie, Liberté," "Thiers, Guizot, Rémusat," and "La Femme du XX^e siècle."

Simonides (sī-mŏn'ĭ-dēz), or **Semonides**, commonly called OF AMORGOS, though b. at Samos; Greek iambic poet who flourished abt. 625 B.C. Known chiefly by a satirical poem, in which various types of women are represented as descended from various animals. Only one type receives his commendation, the "bee woman"; the rest are handled without mercy and with a kind of personal spite.

Simonides, 556–468 B.C.; one of the greatest lyric poets of Greece. His sunny temper and easy philosophy made him welcome, whether he sojourned with the Pisistratidæ at Athens or among the Scopadæ and Aleuadæ of Thessaly. After Marathon, this encomiast of tyrants and oligarchs won the prize over Æschylus for his elegy on those who had fallen, and his distich on the dead of Thermopylæ is the most famous in literature. At the court of Hiero he came into collision with his great rival, Pindar, who claimed a loftier spirit and a truer inspiration; and the very wit and grace of Simonides, his sympathy with the spirit of the age, the mundane tone of his poetry, his almost sophistic dexterity have justified the claims of Pindar in the eyes of critics. Of his many lyrics a fragment remains to warrant what the ancients say of the perfection of his style in everything that he touched, of the exquisite tenderness of his dirges, in which he surpassed all rivals, and of his unequaled command over the resources of the epigram.

Si'mon Mag'us, a Samaritan of the apostolic age; b. Gitton, a village near Nablus. He is described in Acts viii, 9–24, as a sorcerer, called by the people "that power of God which is called great"; was apparently converted by Philip, and sought to purchase the power of imparting the Holy Ghost; whence the expression *simony*. Of his later history the ancient accounts are discordant. The Simonians, one of the earliest of the Gnostic sects, lasting for several centuries, took their name from him, and he became a sort of archetype of heresy.

Simonoseki'i. See SHIMONOSEKI.

Sim'ony, in canon law, the buying or selling of ecclesiastical offices or benefices, named from Simon Magus. By all Christian denominations simony is denounced as a great crime, but it has been at various periods an almost universal practice.

Simoom', a hot, scorching wind which rises in the sandy deserts when intensely heated by the sun, and blows, loaded with fine sand and dust, over Palestine, Syria, and Arabia. It generally occurs at the equinoxes, and lasts for several hours. It is dreaded, as it often proves fatal to animal life from its heat, which rises to 126°, and the suffocating dust with which it is filled. Similar winds are the khamsin in Egypt, the samiel of Turkey, the sirocco of Italy, the solano of Spain, the harmattan of Guinea and Senegambia, etc.

Sim'plified Spell'ing. See ORTHOGRAPHY.

Simplon (săn-plōn'), village and mountain pass between Valais and Piedmont; famous for the military road which Napoleon I built here from 1800 to 1806. The culminating point is 6,218 ft. above the sea. The scenery on the S. slope is grand and severe in the extreme.

Simplon Tun'nel, a railway tunnel through the Alps, extending from Brieg, Switzerland, to Iselle, Italy, a distance of about 12 m. Its highest elevation is 2,312 ft. It was begun in November, 1898, and opened for traffic in 1906.

Sims, James Marion, 1813–83; American surgeon; b. Lancaster Co., S. Carolina; graduated M.D. at Jefferson Medical College, 1835; practiced in Montgomery, Ala., then (1853) settled permanently in New York City. Through his efforts the Woman's Hospital of the State of New York was founded, 1857–58; 1861–68 he made a trip through Europe, where he was highly honored. He organized the Anglo-American Ambulance Corps, 1870, and went with it as surgeon in chief to Sedan. To his labors and discoveries and inventions are mainly due the establishment of the science of gynecology as a new department of medicine.

Simula'tion. See FEIGNED DISEASES.

Sinai (sī'nā), triangular peninsula of Arabia Petræa, between the gulfs of Suez and Akabah. Its base is 150 m. across, its W. side 186 m. long, its E. side 133, and its area abt. 11,500 sq. m. First comes the wedgelike protrusion of the limestone plateau known as the Desert of the Wandering, then a sandstone belt, and finally the mountain masses of granite and porphyry, flanked right and left by narrow strips of lowland bordering the gulfs. These mountains may be divided into three groups, the highest peaks of which, respectively, are Serbal (6,734), Catharine (8,526), and Shomer (8,449). The Egyptians called this peninsula "the land of the gods," on account of its solitary grandeur. Mines of iron, copper, and turquoise were once worked here. It is still the home of about 5,000 Bedouins. The curious inscriptions, found mostly on the W. side of the peninsula, are generally in the Nabatæan character, and the Nabatæans were, about the beginning of the Christian era, the chief traders between Egypt and Assyria. Some of the inscriptions are Greek and a few Coptic. With them are rude drawings. The whole was probably the work of caravans between 200 B.C. and 400 A.D., and of no more importance than such scratchings usually are.

Sinai is also a name used in the Old Testament interchangeably with Horeb to designate the Mountain of the Law. It has been identified with five-peaked Serbal, the most picturesque of all the mountains of the peninsula; but the true Sinai is a gigantic mass, about 2 m. long from N. to S. and ½ m. wide from E. to W. Its SE. peak, Jebel Musa, is the traditional scene of the giving of the Law; but there was not open space enough on the S. side of the mountain to accommodate the Hebrew host. Its NW. peak, called Sufsafeh, overlooks three wadies (Rahah, Deir, and Leja), which might easily have held 3,000,000 or 4,000,000 people; and there is no other such spot anywhere in the whole peninsula.

Here the Israelites encamped for a year, and here the Law was given. The watershed at the foot of Sinai is 5,140 ft. above the sea, Jebel Musa 7,359, Sufsafeh a little lower. The convent of St. Catharine, in whose library Tischendorf discovered the Sinaitic Codex of the Scriptures and Mrs. Lewis the oldest text of the Syriac Gospels, is on the E. side of the mountain.

Sinait'ic Inscrip'tions. See CODEX SINAITICUS.

Sinalo'a (formerly often CINALOA), NW. maritime state of Mexico; area, 33,671 sq. m.; rich in gold and silver mines. Pop. (1900) 296,701. Capital, Culiacan; chief port, Mazatlan.

Sind (formerly SINDH or SCINDE), W. province of British India; area, 47,066 sq. m., or including the State of Khairpur, abt. 53,000 sq. m. It occupies the Indus delta, and is for the most part monotonous, nearly treeless, with many dead and few live water courses. The soil is sandy or clayey, and impregnated with salt and alkali. It lacks the monsoons, and rain in some parts is almost unknown. The Indus bears to it the same relation that the Nile does to Egypt. The climate is extremely hot. It is unhealthful, and subject to fevers and cholera. Only seven or eight per cent of the land is cultivated. There are two crops; those of the spring are cereals, legumes, and oil seeds. The second harvest yields millet, rice, and cotton. The fauna includes the tiger, hyena, wolf, fox, onagra, wild boar, antelope, and deer. Fishing is an important industry, and dried fish are exported. The pop. in 1901 was 3,210,910 for Sindh and 131,937 for Khairpur.

The inhabitants are mostly Mohammedans, including the Sindhis, formerly Hindus, now Sunnites. These form about half of the population; they are tall, robust, apathetic, and lazy, are without caste, have a Neosanskrit language of interest, with a small literature. The capital is Karachi or Kurirâché; pop. (1901) 116,663. This country was probably visited by the Persians under Scylax, and by one of the generals of Alexander. It probably formed a part of the Greco- or Indo-Bactrian kingdom. The sacred city of Patala was once its capital, and it is supposed that Haidarabad occupies its site. It has undergone remarkable political revolutions, and the variations in the course of the Indus have made its physical changes quite as remarkable. It contains numerous ruins, often in localities now uninhabitable because of lack of water. It became a British province in 1843.

Sin'dia, or Scindia, dynastic name of the most powerful of the Mahratta princes of India. The family took its rise in RANOJI SINDIA, a low-caste retainer of the Mahratta peishwa, who in 1743 received as a fief half the province of Malwa. His son, MADHOJI SINDIA (d. 1794), joined the Mahratta confederacy; fought against the Afghans at Paniput (1761); became an ally of the Emperor of Delhi; expelled the Sikhs from central India, and became virtual ruler; fought against the British, 1779–82; was confirmed in his possessions by the Treaty of 1783; captured Gwalior, 1784; seized Delhi and Agra; reduced the Rajput states, and formed an army, disciplined by French adventurers. His grandnephew and successor, DAULAT RAO SINDIA, ruled from 1794 to 1827; waged war against the rival family of Holkar; was defeated by Sir Arthur Wellesley (afterwards Duke of Wellington) at Assaye, and by Lord Lake at Laswari, and submitted to British influence, but retained his capital and a portion of his territories. BAJI RAO SINDIA, 1843–86, was a loyal ally of the British during the mutiny of 1857–59.

Singan' Fu, or Sigan-foo, city of China; capital of province of Shensi, and sometimes the capital of the empire. It is in the basin of the Wei, the most important affluent of the Yellow River, and is commercially of importance. Its walls, which have a circuit of 24 m., are well built, and its pavilioned gates surpass in magnificence those of Pekin. Pop. abt. 200,000. Here in 1857 was found a tablet covered with inscriptions in Chinese and Syriac, and dated 827 A.D., recording the establishment of Christianity in this neighborhood by the Nestorians in the fourth century.

Singapore', an island off the Malayan Peninsula. It contains the town of Singapore, founded by the Malays 1283, ceded to the British 1819, and rendered a free port in order to strike a blow at the Dutch; 1853 the capital of the Straits Settlements. The area of the island is 206 sq. m. The climate is agreeable to Europeans; during the day the heat is intense; the atmosphere is very moist, there being usually a fall of rain every week. The population of the island was 228,555 in 1901. The city was once a dreaded lurking-place for pirates, but developed into a great commercial center. The city had a population of 193,089 in 1901.

Sin'gle Tax, a term in use since 1887 to denote the proposal which aims at the collection of all public revenues from one single source, what in economics is termed "rent," the value of land itself, irrespective of the value of any improvement in or on it; or a proposal or movement which aims at the appropriation of economic rent, the "unearned increment of land values" to public uses, by taxation.

These two forms of statement, though often indiscriminately used, since the practical method of reaching the single tax from existing conditions is "to abolish all taxation save that on land values," are suggestive of two different points of view—the fiscal and the moral—that of governmental expediency and that of social justice. Its advocates maintain that it offers the cheapest and best method of raising revenue—since a tax on the value of land is not a tax on land, but on an advantage accruing on specially desirable land, which can in no case go to the land user as user, it cannot check production, or lessen the return from use or improvement, or be shifted from shoulder to shoulder, increasing in weight as it goes. Avoiding all the waste, loss, and fraud of indirect taxes, it also avoids the

evasions and injustice that attend attempts to tax incomes of all kinds, and is of all possible taxes that which may be most cheaply, certainly, and equitably obtained. See TAXATION.

Sing' Sing. See OSSINING.

Si'nim, name used in the Bible for the Seres, or ancient Chinese.

Sink'ing Fund. See FINANCE.

Sinn Fein (shin fān), a term derived from the Gaelic, meaning "ourselves alone," which was applied to a weekly newspaper founded in Dublin, 1899, and adopted by the United Irishmen, 1905. Its stated purpose was that of "having the Irish people recover its nationality in every possible way, in language, in dress, in the development of Irish resources and industries, and in progress along national lines." In the early part of the World War the organization was charged with being under German domination. On April 24, 1916, a serious uprising occurred in Dublin, the declared purpose of which was the founding of an Irish republic. The disturbance ended on the 30th. The capture of Sir Roger Casement, April 21, after he had been landed by a German submarine, led to disclosures showing whence the later inspiration of the movement came. See DUBLIN.

Sino'pe, town in Asia Minor; the most important of the Greek colonies on the Black Sea, and capital of Pontus. Mithridates was born here (134 B.C.). In its harbor the Ottoman fleet was defeated by the Russians (1853), which event brought on the Crimean War. Pop. (1901) 9,749.

Sin'ters, mineral substances deposited as incrustations from the waters of mineral springs. The principal are siliceous and calcareous sinters. The mass of siliceous sinters are composed of hydrates of silica.

Sioux (sō), or **Dako'tas,** tribe of American Indians, dwelling near the head waters of the Mississippi when first known by the whites. In 1640 the Algonquins informed the French of them as the Nadowesioux, whence they came to be called Sioux. They joined the Foxes against the French, and in war with the Chippewas many were forced down the Mississippi, and, driving other Indians from the buffalo plains, took possession of them. Several bands wandered into the plains of the Missouri. Some remained at or near the St. Peter's. The nation was estimated in 1822 at 5,000 on the St. Peter's and 7,750 on the Missouri. Their territory extended from the Mississippi to the Black Hills, and from Devil's Lake to the mouth of the Big Sioux. In 1851 the nation ceded to the U. S. all their land E. of a line from Otter Tail Lake through Lake Traverse to the junction of the Big Sioux and the Missouri, retaining a reservation 20 by 140 m. The Government's neglect to carry out the treaty provisions led to hostilities. In 1862 the Sioux in Minnesota rose and killed nearly 1,000 settlers, but were finally put down. In 1863 the Minnesota Sioux were removed to Crow Creek. The most guilty bands fled N.

In 1875 the Dakota family, of which the Sioux or Dakotas proper constitute the greater part, numbered about 50,000, chiefly in Dakota, but some in Montana and a few in Nebraska. Among the principal bands are the Santees, Yanktons, Sissetons, Wahpetons, Oncpapas, Blackfeet Sioux, Yanktonais, Brulés, Minneconjous, and Ogallalas. In 1876 the Sioux were with much difficulty induced to cede their title to the Black Hills. The bands under Sitting Bull, Crazy Horse, and other chiefs were hostile, and in June Gen. Custer was killed and his command annihilated in an attack upon their camp. Operations were continued against them, and later nearly all came in and submitted. Large Sioux settlements have been made in S. Dakota.

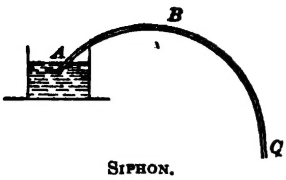
The civil and religious institutions of the Sioux are determined by kinship. The unit of the social organization is the *gens*, characterized by one or more taboos. The religious and the legislative, executive, and judicial functions are exercised by chiefs whose tenure of office is limited by age or other physical incapacity, or by misconduct. The chiefship descends from father to son, unless the ambition and influence of a near relative displace him. With some exceptions descent is in the line, although the entire system of consanguinity and affinity bears traces of a period in which descent was in the female line. A plurality of wives is deemed essential to wealth, which is one avenue to power; divorce is optional with the husband. Civil government, personal conduct, property rights, corporations or organized bodies of persons, war, and international relations are regulated by laws and compacts. Indirectly related to the civil government are two kinds of associations for religious, industrial, and other purposes, the first being the feasting organizations and the second the brotherhoods or dancing societies, to some of which the shamans belong. Murder and rape, as a rule, are punished or avenged by death at the hands of kindred of the victim.

Sioux Cit'y, capital Woodbury Co., Iowa; at the junction of the Big Sioux and Missouri rivers; second city in size in the state. It is the gateway to S. Dakota, the upper Missouri region, and the Black Hills mining and grazing country. In 1909 there were 136 factories, with a capital of $13,603,000, and turning out products valued at $37,424,000. Meat packing is the foremost industry. The principal productions were stoves, engines, shoes, flour, soap, starch, wagons, plows, tile, brooms, furniture, and clothing. The jobbing trade amounts to about $30,000,000 per annum. Sioux City was settled by traders in 1849, was a Government post during the early Indian troubles, and the outfitting point for the Black Hills expeditions. Pop. (1910 census) 47,828.

Sioux Falls, capital Minnehaha Co., S. Dak.; on the Big Sioux River, 90 m. N. of Sioux City, Iowa. It is in an agricultural and stone-quarrying region; has large stock-raising interests; derives great power from the river. The streets are paved with jasper, quarried near the city. Pop. (1910) 14,094.

Si'phon, a bent tube for conveying water from a reservoir, *A*, to a lower level, *C*, over

an elevation, *B*, which is not more than 33 ft. higher than *A*. To put the siphon into action the air must be exhausted, and then the atmospheric pressure on the surface of the water at *A* causes the water to rise and flow over, with a velocity depending upon the difference of level between *A* and *C*. The siphon is used for emptying casks, and sometimes on pipe lines for waterworks, but in the latter case a pump is placed at *B*, in order to remove the air which otherwise accumulates there and diminishes the flow.



SIPHON.

Sirbo'nian Bog, or **Sirbo'nic Lake,** formerly a long, narrow body of water, separated from the Mediterranean by a low strip of shore, and extending E. from Pelusium in Egypt. It is now dry and covered with sand. At the beginning of the Christian era it was a marsh. Strabo states that it was a deep body of heavy water into which one could not dive, and that asphalt or bitumen rose to the surface near the middle of it. One of the principal routes to Asia led along the narrow neck between sea and lake, but it was dangerous at certain states of wind and tide. Artaxerxes is said to have lost a part of his army when attempting the passage. The route of the Exodus proposed by Brusch included the crossing of the bog by the Israelites, but the discovery of the site of Pithom overthrew his theory by locating the initial stages of the itinerary about midway of the isthmus.

Sir Dar'ya. See SYR DARIA.

Si'ren, a genus of tailed amphibians of the S. parts of the U. S. The only species is *Siren lacertina*, the mud eel of the Carolina rice swamps. It has two weak fore legs, no hind limbs, permanent gill tufts, as well as lungs, is 2 ft. long, and black. It is considered venomous by the negroes. *Pseudobranchus striatus* is a smaller but very similar animal.

Sire'nia, order of mammals including the sea cows. See DUGONG and MANATEE.

Si'rens, or **So'this,** in Grecian mythology, maidens who lived on an island between Scylla and the island of Circe, and by their songs charmed mariners to their ruin, for whoso heeded their singing saw nor wife nor home again. It was fated that the Sirens should die as soon as anyone should pass by without heeding their singing. Odysseus escaped their allurements only by stuffing his companions' ears with wax and having himself securely tied to the mast. The Argonauts escaped them because they were charmed by the superior singing of Orpheus. The Sirens were changed for one reason or the other to sunken rocks located at Pelorum, or Sorrento, or Capri, or the Sirenusæ. In earliest times they were represented as birds with the heads of maidens, and later as creatures with the body of a maiden and the legs and wings of a bird.

Si'rius, the dog star, a star of *Canis maj* the brightest star in the heavens. It may seen in the S. in the winter evenings. Fro the expressions of ancient writers it is claim to have been once red, though now a brillia white, but the question of its former color not yet settled. It was believed to exercise powerful and baleful influence upon huma affairs. See DOG STAR.

Siroc'co, a hot, relaxing wind which rises the Sahara, then blows across the Mediterr nean, where it occasionally becomes filled wi moisture, and finally over Sicily, S. Ital Malta, etc. It occurs in spring and autum lasts for one or two days, though sometim for a week, and is injurious to vegetable ar animal life, causing exhaustion and depre sion.

Sisal' Hemp, the fiber of agave. Much sis hemp is produced in Yucatan and at Ke West, Fla. It makes excellent cordage, sup rior to that of true hemp, but it is chiefl made into hammocks.

Sis'kin, an Old World bird, *Spinus* or *Chry omitris spinus*, of the family *Fringillidæ*. Th male is a prevailing olive green above and ye lowish white below, streaked with black on th back and sides, and with a black throat an crown. It is a favorite cage bird. The pin siskin (*S. pinus*) and the American goldfinc are related N. American species.

Sismon'di, Jean Charles Léonard Simonde de 1773–1842; French historian and politica economist; b. Geneva; political disturbance drove his family into exile in England an Italy. His first work was on political econ omy, "De la Richesse commerciale," based o the ideas of Adam Smith, which he afterward abandoned, and even opposed, in his "Nou veaux Principes d'Économie politique" and "Études sur les Sciences sociales." His ac quaintance with Mme. de Staël, Benjamin Constant, Guizot, etc., turned his attention from political economy to history, and it was as an historian that he acquired celebrity through his "Histoire des Républiques italiennes du moyen âge," "La Littérature du Midi de l'Europe," and "Histoire des Français."

Sis'terhoods, in the religious sense, unions of women devoted by public vows to religious work. They are in idea nearly as old as monasticism, for female branches of all the principal monastic orders were organized by the original founders, whose members are called nuns. A distinction between a sister and a nun is that the former, unlike the latter, is not shut up in a convent, nor given up to contemplation and ascetic practices. The first sisterhood, still the most famous of all, was founded by St. Vincent de Paul in 1629, and is known as Daughters or Sisters of Charity, Gray Sisters, and Sisters of St. Vincent de Paul. (See CHARITY, SISTERS OF.) One order, the Irish Sisters of Charity, founded 1815, uses an adaptation of the Jesuit rule. The vows of all are of poverty, celibacy, and obedience, with, in some cases, other obligations. Protestant women do not, as a rule, favor sisterhoods. They prefer to work independently.

AUG 25 1920